APPENDIX A
SNOHOMISH COUNTY, COMMUNITY, AND AGENCY/ORGANIZATION STAKEHOLDER MEETING SUMMARIES

APPENDIX A-1
DRAFT EVALUATION CRITERIA REVIEW MEETING WITH SNOHOMISH COUNTY
10/30/2014

Meeting Summary:

Draft Evaluation Criteria Review Meeting with Snohomish County

Meeting Date and Location:

October 30, 2014, Snohomish County Parks, Snohomish, WA

Participants

- Anchor QEA: Peter Hummel, Kathy Ketteridge
- Confluence Environmental: Paul Schlenger
- Snohomish Parks: Logan Daniels, Sharon Swan, James Yap, Kathleen Herrmann, Dave Lucas, Frank Leonetti

Attachments

- Attachment 1: Draft Evaluation Criteria (10/30/2014)
- Attachment 2: Revised Evaluation Criteria (12/11/2014)
- Attachment 3: Revised Project Schedule (11/21/2014)

Discussion points on draft evaluation criteria (see Attachment 1 for original Evaluation Criteria list and Attachment 2 for revised Evaluation Criteria list):

Parks and Recreation

- For ADA accessibility; review of Federal Guidelines will be important
- For habitat/public use balance – important not to segment habitat areas with public use areas
- There are many educational programs that go on in the park currently; we will want to compile the specifics of these programs as part of our alternatives development/evaluation
- Operations should be added to Maintenance and Maintainability criteria
- Public safety and sustainability should be their own stand-alone criteria
- Signage is an important feature for conceptual develop development, but will not be used as an evaluation criteria

Coastal Processes

- Add a criteria (or add to existing criteria) the effect on coastal processes related to delta/channel migration
- Potential erosion of railroad embankment should be considered in development of conceptual alternatives
- Sustainability should be its own criteria; consider a time frame of 50 years long-term sustainability discussion

Habitat Restoration

- There were several criteria that overlap with coastal processes evaluation, so eliminate repetitive criteria
- Include expanding the transition zone between salt and fresh water habitats as a criteria

BNSF

- Public safety (keeping pedestrians off of BNSF tracks) should be its own criteria
- Approval process for BNSF will be included as a criterion for public/stakeholder support.

Permitting Requirements

- Agency approval or buy-in will be included as a criterion for public/stakeholder support.

Cost Considerations

- This criterion should be called cost/benefit consideration.

Funding Opportunities

- No substantive comments

General/Other

- Support of the project from the public/stakeholders/agencies/BNSF should be made into a separate criteria

Discussion on project schedule and agendas of 1st public and stakeholder meetings:

- Original project schedule was developed to finish report in May to coincide with grant funding deadlines.
- Dates for public and stakeholder meetings were discussed, and additional outreach was proposed to finalize both of these dates.
- There was a decision made that the agenda for the first public and stakeholder meetings should not include discussion of developed conceptual alternatives.
- The original project schedule was revised to complete conceptual alternatives development after the public/stakeholder meetings. Revised schedule attached (see Attachment 3).

ATTACHMENT 1
DRAFT EVALUATION CRITERIA
10/30/2014

Draft Evaluation Criteria (for County Review and Discussion)

Parks and Recreation

1. Pedestrian Access and Circulation
    a. ADA Accessibility
        i. Year round access to beach under RR tracks
        ii. Space for ADA users to enjoy views of beach above high tides and out of way of other users.
        iii. Other ADA access changes
    b. Loop Pedestrian Circulation in Lower Park Area (maintains/not maintained)
    c. Balance public access opportunities with habitat protection
2. Park Use Areas
    a. Conversion of Lower Lawn Areas to Habitat (amount of conversion to marsh/riparian)
    b. Ability to provide suitable Use Areas for current and anticipated programs and user groups
    c. Facilitates educational uses of Park (including environmental education programs, such as Adopt a Stream, and use by school groups)
3. Views
    a. Distant views: Facilitates New Views of water/Puget Sound
    b. Close in views: Changes existing views of meadow or surrounding ravine from lower park area.
4. Facility Relocation
    a. Sani-Can Enclosure
    b. Picnic tables
    c. Culvert/beach access
5. Maintenance and Maintainability
    a. Facility Maintenance other than Culvert (changes to other park facilities)
    b. Culvert/Public and Fish Access Maintenance (increase/decrease/same as existing)
6. Public Safety
    a. Potential user conflicts with the BNSF tracks
    b. Shoreline wave and erosion affecting park
    c. CPTED compatibility
    d. Emergency access

Coastal Processes

1. Sediment transport capacity of opening (for creek sediment loads)
2. Sediment transport distribution on delta
3. Shoreline wave and erosion affecting park (wave propagation through opening)
4. Sustainability (stability/adaptability/sea level rise)

Habitat Restoration

1. Nearshore Pocket Estuary Habitat
    a. Quantity of aquatic habitat available between railroad crossing and edge of tributary delta. Consider habitat availability at a range of tide stages
    b. Complexity and diversity of nearshore habitat

        i. Saltmarsh emergent vegetation
        ii. Backshore area and vegetation
2. Juvenile salmon fish passage conditions
    a. Ability for fish to move past railroad corridor and enter lower creek habitats.
    b. Depth and velocity conditions at range of tide stages and creek flows.
3. Creek meander potential – width of area from lower creek and railroad corridor for creek to flow across different flow paths over time
4. Freshwater Habitat
    a. Instream habitat – LWD, riparian vegetation cover, substrate (embeddedness)
    b. Freshwater wetland
5. Habitat connectivity - includes benefits to species other than fish

BNSF

1. Consistent with railroad engineering standards
    a. Within track alignment flexibility
    b. Compatible with potential future track addition
2. Constructability of bridge/culverts
3. Operations affecting constructability/permitted track time

Permitting Requirements

1. Consistency with local, state and federal requirements/agency support anticipated
2. Project Impacts affecting level of review and timelines
    a. Natural resources impacts, including conversion of habitats (e.g. wetland to stream and vice versa) and potentially associated mitigation and monitoring requirements
    b. Cultural resources impacts (historic tunnel, other pre-contact resources) and extent of potentially required fieldwork, documentation, and mitigation requirements
    c. ESA Considerations
        i. Temporary construction impacts – dewatering, turbidity, noise (pile driving) etc.
        ii. Long-term impacts – e.g. overwater cover
3. Long-term permit coverage or requirements for ongoing maintenance activities
4. Public and stakeholder support
    a. Native American Tribes
    b. BNSF
    c. General Public

Cost Considerations

1. Design and Permitting
2. Construction
3. O&M Costs

Funding Opportunities

1. Probability to obtain grants
2. Additional fundraising and partnership opportunities

ATTACHMENT 2
REVISED DRAFT EVALUATION CRITERIA
12/11/2014 (REVISED FROM 10/30/2014)

Revised Draft Evaluation Criteria

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Public Safety

- Beach Access Across BNSF Right-of-Way

Support for Project

- Stakeholders
- Permitting Agencies

Parks and Recreation

- Pedestrian / ADA Access and Circulation
- Balance Public Access Opportunities with Habitat Protection
- Conversion of Lower Lawn Areas to Habitat
- Facility Relocation
- Operations and Maintenance
- Ability to Provide Suitable Use Areas for Current and Anticipated Programs and User Groups, including Education Uses
- Views

Sediment Transport and Coastal Processes

- Sediment Transport Capacity of Opening, for Creek Sediment Loads
- Potential for Channel Migration and Meandering
- Shoreline Wave and Erosion Affecting Park and Railroad
- Sediment Transport Distribution on Delta

Habitat Restoration

- Quantity and Diversity of Nearshore Habitat Waterward of Railroad Crossing
- Juvenile Salmon Fish Passage Conditions into Lower Creek
- Size of Transition Zone between Saline and Freshwater Habitats
- Quality of Lunds Gulch Creek Habitat
- Quantity and Quality of Riparian Vegetation along Stream and Nearshore
- Quality of Freshwater Wetland
- Habitat Connectivity for Non-fish Species

BNSF

- Consistent with Railroad Engineering Standards
- Constructible within BNSF Work Windows
- Meets BNSF O&M Standards

Funding Opportunities

- Probability to Obtain Grants
- Additional Fundraising and Partnership Opportunities

Sustainability

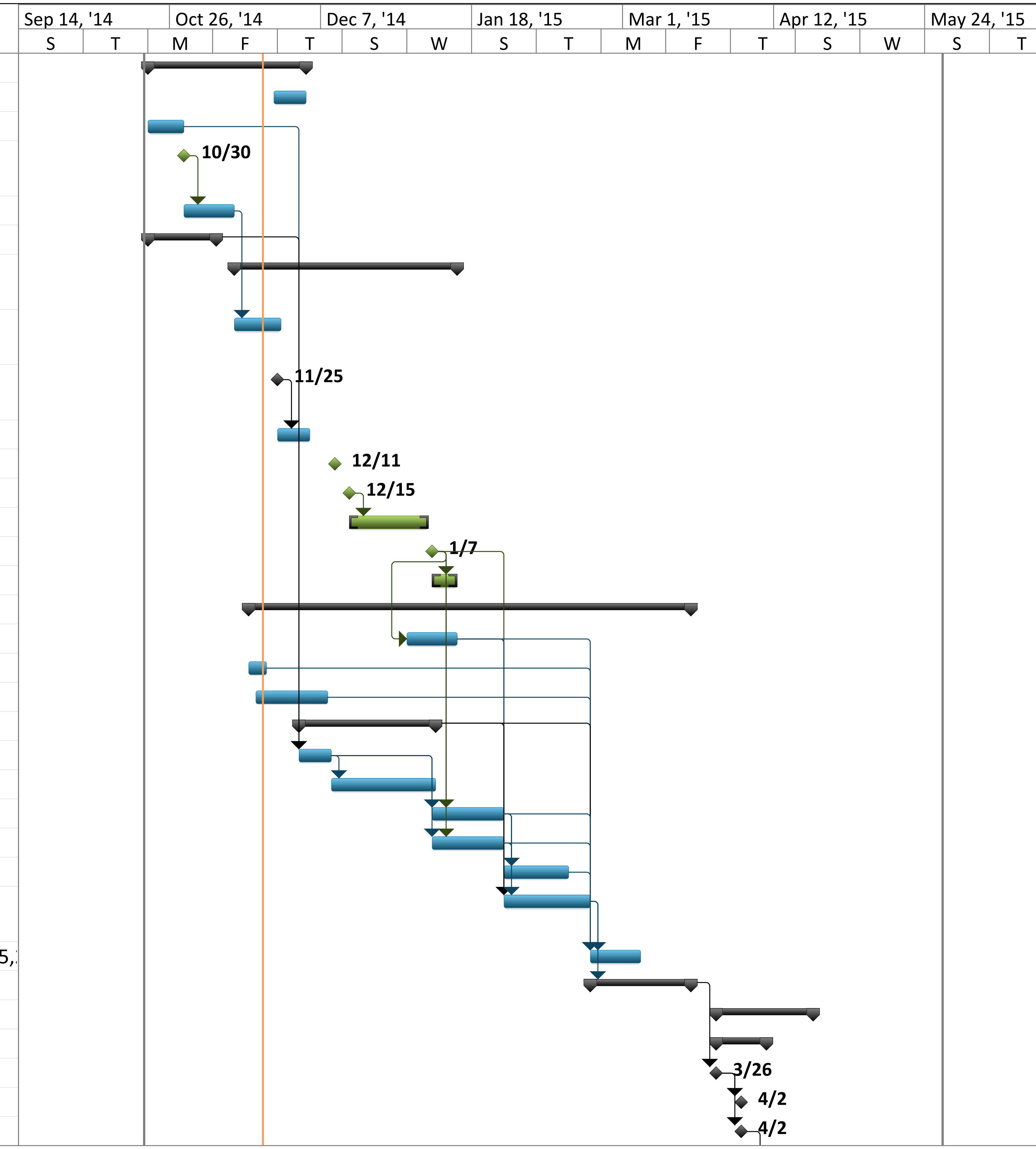
Cost/Benefit Considerations, Short- and Long-Term

ATTACHMENT 3
PROJECT SCHEDULE
11/21/2014

Project Schedule

Developed by Anchor QEA (KeK)

ID		Task Mode	Task Name	Duration	Start	Finish	Predecessors
1			**Task 2 - Develop Draft Evaluation Criteria**	**32 days**	**Mon 10/20/14**	**Tue 12/2/14**	
2			Draft Matrix of Funding Sources	7 days	Mon 11/24/14	Tue 12/2/14	
3			Draft Evaluation Criteria	8 days	Mon 10/20/14	Wed 10/29/14	
4			Meeting with County to Discuss Draft Evaluation Criteria	0 days	Thu 10/30/14	Thu 10/30/14	
5			Revised Draft Evaluation Criteria	10 days	Thu 10/30/14	Wed 11/12/14	4
6			**Task 3 - Data Compilation and Collection**	**15 days**	**Mon 10/20/14**	**Fri 11/7/14**	
9			**Task 4 - Develop Conceptual Alts and Finalize Eval. Criteria**	**44 days**	**Thu 11/13/14**	**Tue 1/13/15**	
10			Develop Agenda/Presentation for SH/Public Meetings	9 days	Thu 11/13/14	Tue 11/25/14	5
11			Conference Call with County to Discuss Agenda/Presentations	0 days	Tue 11/25/14	Tue 11/25/14	
12			Revise Agenda/Presentations	7 days	Tue 11/25/14	Wed 12/3/14	11
13			Stakeholder Meeting	0 days	Thu 12/11/14	Thu 12/11/14	
14			Public Meeting #1	0 days	Mon 12/15/14	Mon 12/15/14	
15			Develop Conceptual Alternatives	16 days	Mon 12/15/14	Mon 1/5/15	14
16			Meeting with County to Review Draft Alternative	0 days	Wed 1/7/15	Wed 1/7/15	
17			Finalize Conceptual Alts. And Evaluation Criteria	5 days	Wed 1/7/15	Tue 1/13/15	16
18			**Task 5 - Planning Level Studies and Investigation**	**89 days**	**Mon 11/17/14**	**Thu 3/19/15**	
19			Park and Recreational Needs (5.1)	10 days	Wed 12/31/14	Tue 1/13/15	16FS-5 days
20			Cultural Resources (5.2)	5 days	Mon 11/17/14	Fri 11/21/14	
21			Environmental Phase 1 (5.3)	14 days	Wed 11/19/14	Mon 12/8/14	
22			**Geotechnical Investigation (5.4)**	**28 days**	**Mon 12/1/14**	**Wed 1/7/15**	
23			On-site Geologic Reconnaissance	7 days	Mon 12/1/14	Tue 12/9/14	3,6
24			Evaluation	21 days	Wed 12/10/14	Wed 1/7/15	23
25			Hydraulic Analysis of Lund's Gulch Creek (5.5)	14 days	Wed 1/7/15	Mon 1/26/15	23,16
26			Coastal Analysis (5.6)	14 days	Wed 1/7/15	Mon 1/26/15	23,16
27			Fisheries and Habitat (5.7)	14 days	Tue 1/27/15	Fri 2/13/15	25,26
28			Intial Railroad Infrastructure and Coordination (5.8)	18 days	Tue 1/27/15	Thu 2/19/15	19,22,25,16
29			County Review of Studies/Deliverables from Tasl	10 days	Fri 2/20/15	Thu 3/5/15	19,20,21,22,25,:
30			**Benefits and Concept Level Costs (5.9)**	**20 days**	**Fri 2/20/15**	**Thu 3/19/15**	**28FS-14 days**
33			**Task 6: Select and Refine Preferred Alternative**	**19 days**	**Thu 3/26/15**	**Wed 4/22/15**	
34			**Choose Preferred Alternative**	**10 days**	**Thu 3/26/15**	**Thu 4/9/15**	
35			Meeting with County	0 days	Thu 3/26/15	Thu 3/26/15	30FS+5 days
36			Public Meeting #2	0 days	Thu 4/2/15	Thu 4/2/15	35FS+5 days
37			BNSF Meeting	0 days	Thu 4/2/15	Thu 4/2/15	35FS+5 days



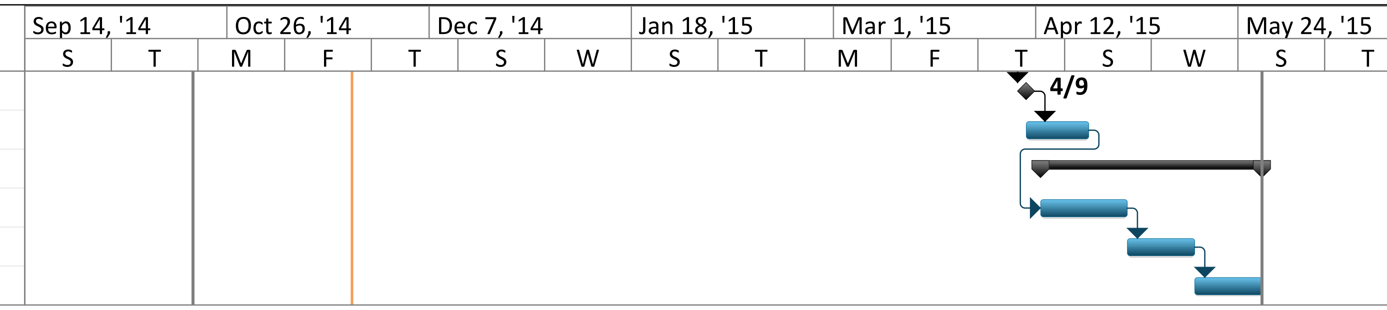
Meadowdale Feasibility Study
Revised 11/21/2014

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Project Schedule

Developed by Anchor QEA (KeK)

ID		Task Mode	Task Name	Duration	Start	Finish	Predecessors
38			Permitting Agency Meeting	0 days	Thu 4/9/15	Thu 4/9/15	37FS+5 days
39			Refine Preferred Alternative	9 days	Fri 4/10/15	Wed 4/22/15	38
40			**Task 7: Feasibility Report**	**34 days**	**Mon 4/13/15**	**Thu 5/28/15**	
41			Draft Report	14 days	Mon 4/13/15	Thu 4/30/15	39FS-8 days
42			County Review of Draft Report	10 days	Fri 5/1/15	Thu 5/14/15	41
43			Final Report	10 days	Fri 5/15/15	Thu 5/28/15	42



Meadowdale Feasibility Study
Revised 11/21/2014

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

APPENDIX A-2
MINUTES: AGENCY/ORGANIZATION STAKEHOLDER MEETING
12/11/2014

Minutes: Agency/Organization Stakeholder Meeting

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Thursday, December 11, 2014, 10:00 am to 12:00 pm

Attendees

Snohomish County Staff
- Logan Daniels
- Sharon Swan
- Kathleen Herrmann
- Frank Leonetti
- Tom Teigen
- James Yap

Anchor QEA, Consultants
- Kathy Ketteridge
- Peter Hummel

Confluence Environmental, Consultants
- Paul Schlenger

Agency/Organization Stakeholders

Introductions, Purpose of Meeting, and Overview

Logan introduced the Snohomish County staff and consultants. She explained that the purpose of the meeting was to obtain input on the evaluation criteria. Tom Teigen provided an overview of the project context. A PowerPoint presentation for a portion of the meeting included a presentation of the preliminary evaluation criteria. Copies of the agenda and list of preliminary evaluation criteria were provided to all participants.

Project History, Objectives, Scope, and Schedule

- Logan provided a brief overview of the project history and sediment conditions at the culvert that have led to the project.
- Logan presented an overview of the objectives of the project.
- Kathy Ketteridge provided an overview of the schedule, the main tasks in the project scope of work, and the studies that will be conducted of the conceptual alternatives.
- Additional opportunities for an Agency/Organization Stakeholder Meeting will be when the draft project deliverables are provided to the County for review.

Preliminary Evaluation Criteria and Round-Robin Discussion

Kathy, Peter, and Paul presented the preliminary evaluation criteria and described how they will be used to evaluate proposed alternatives and in selection of the preferred alternative. Following this overview, each agency/organization stakeholder was allowed up to 5 minutes to comment on the proposed evaluation criteria and the project in general. Kathy typed comments as they were provided, and the typed comments were visible on the projector screen. The comments are attached; organized by topic.

Next Steps and Meeting Adjournment

- Logan described the upcoming steps in the project including development of conceptual alternatives.
- Meeting Minutes and other project information will be posted on the County's website, and Logan provided that information.

Attachments

- Attachment 1: Revised Draft Evaluation Criteria
- Attachment 2: Agency/Organization Stakeholder Meeting Discussion Notes
- Attachment 3: Agency/Organization Stakeholder Meeting Presentation
  (on file with Snohomish County Parks)

Meeting summary prepared by	*Kathy Ketteridge and Peter Hummel, Anchor QEA, LLC*	*January 2015*

Communicate any discrepancies in these meeting minutes, in writing, to Kathy Ketteridge (kketteridge@anchorqea.com) within 7 days.

ATTACHMENT 1
REVISED DRAFT EVALUATION CRITERIA

Revised Draft Evaluation Criteria

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Public Safety

- Beach Access Across BNSF Right-of-Way

Support for Project

- Stakeholders
- Permitting Agencies

Parks and Recreation

- Pedestrian / ADA Access and Circulation
- Balance Public Access Opportunities with Habitat Protection
- Conversion of Lower Lawn Areas to Habitat
- Facility Relocation
- Operations and Maintenance
- Ability to Provide Suitable Use Areas for Current and Anticipated Programs and User Groups, including Education Uses
- Views

Sediment Transport and Coastal Processes

- Sediment Transport Capacity of Opening, for Creek Sediment Loads
- Potential for Channel Migration and Meandering
- Shoreline Wave and Erosion Affecting Park and Railroad
- Sediment Transport Distribution on Delta

Habitat Restoration

- Quantity and Diversity of Nearshore Habitat Waterward of Railroad Crossing
- Juvenile Salmon Fish Passage Conditions into Lower Creek
- Size of Transition Zone between Saline and Freshwater Habitats
- Quality of Lunds Gulch Creek Habitat
- Quantity and Quality of Riparian Vegetation along Stream and Nearshore
- Quality of Freshwater Wetland
- Habitat Connectivity for Non-fish Species

BNSF

- Consistent with Railroad Engineering Standards
- Constructible within BNSF Work Windows
- Meets BNSF O&M Standards

Funding Opportunities

- Probability to Obtain Grants
- Additional Fundraising and Partnership Opportunities

Sustainability

Cost/Benefit Considerations, Short- and Long-Term

ATTACHMENT 2
AGENCY/ORGANIZATION STAKEHOLDER MEETING DISCUSSION NOTES

Agency/Organization Stakeholder Meeting Discussion Notes

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Thursday, December 11, 2014, 10:00 am to 12:00 pm

Discussion Notes

- Gravel: What is the load? The gravel will be coming through for years. There will continue to be slides, etc. How will it get through the tunnel and if it deposits at the tunnel entrance (even if it is wide) that will cause an issue similar to the problems we are having now.

- Access for people can be more important than getting fish into the creek (upper). If the trestle is too expensive and we need to put in another tunnel, and if the tunnel is placed in the same place as the original one, then we will have the same issues. We will want to consider moving the tunnel (second one) to another location. Is there an alternative on the table for a second tunnel and if so where would it go? (This will be part of our alternatives analysis being completed as part of this project.)

- WRIA 8 has some plans on the books for this site; these are in line with the objectives for the project as stated during the presentation.

- Good to coordinate with BNSF early.

- Getting people of out the creek; having separate public access from creek access. Overpass could be one idea; however, that could be a challenge for ADA access.

- WRIA 8 does not have a lot of opportunities for doing restoration of these types of systems (heavily armored by railroad right of way), so excited about the opportunity at the project location.

- Next 8-year plan; looking at population through 20XX and how important parks are in these urban areas. The conclusion from that effort, what we are hearing from people, is that the Park is heavily used and folks like the park; we get calls when it is closed. Snohomish County is quite low on areas for water access compared to adjacent counties.

- Land use associated with the watershed. We are focusing on the park here, but something that needs to be brought into the process is the level of development happening in the watersheds, both existing and future planned.
    - One idea: Establish low impact requirements for new development.

- This may happen through the County by 2015.
- Use urban growth surcharge fees to establish a salmon and trout relief fund that could provide some funds that can be grated out to home owners to reduce surface water runoff (existing developments).

- Include in the design what is happening in the upper watershed in the analysis. There are efforts to study stormwater (water quality). If needs can be clearly defined, then we may be able to dovetail some of that into this planned evaluation.

- MRC develops a work plan, and they have prioritized partnering with Parks to support this project. Therefore, there could be opportunities to look at the watershed issues within the context of this evaluation.

- You need to look at what is going on in the watershed. You have to control existing runoff and control that runoff, including for future developments.

- As a resident of Lund's gulch and educator who uses this for students, happy to hear this project is moving forward. Sustainability is important; really consider things on the scale of a trestle that can really open things up as much as possible.
  - Do want to address frustration; the railroad should be responsible for the damage they are doing to the ecosystem. They are significantly part of the problem and there should be a mechanism for holding them accountable for impacts.

- Anthropology is a holistic discipline, which is similar to how the park restoration effort should be evaluated. Therefore, Tom would like to offer assistance on the project within this context. Behavior change that could contribute to solutions of the problem, get the students involved to assist.

- Students already have been providing services to County and others for monitoring and data collection. Some of the work is done for free, and some leverages small contracts or available funding. Students are residents in the watershed as well as students in the field.

- A major concern is public safety; pedestrian safety getting to the beach without going across the tracks themselves. If there is another way to get people safely across then it should be done.

- There is a good amount of political discussion around the coal train proposals. This is along that route. A collision is the main reason that trains are derailed. This can also occur as a result of an emergency stop to try to avoid a collision.

- A train accident could cause a large and/or long-term issue in the area.

- We need to get folks to the beach; this is very important, but we need to do it safely.
- There is some effort to repair the fencing out there now that can keep folks from crossing tracks.
- The organization does have some funds available to increase the safety of railroad crossings (remove or find alternatives to at-grade crossings). You can get up to $20k for each request. Projects could be done in phases, as well as one singular effort.
- It is important to put out there that we have to get pedestrians across to the beach safely without being on tracks.
- Since we have to live with the trains (and traffic will likely increase) we need to make the crossing safe.
- This may be a good location to apply a "mitigation" strategy for public safety based on potential increase in train traffic along this line in the future.
- Strategy for watershed issues would be to "remove" some parcels of property from being developed to reduce stormwater inputs (or keep them from increasing).
- Relative to other locations between Seattle and Everett, this location stands out for fisheries benefits. So, it is a priority site compared to other sites. This is due to sediment load (not sediment starved).
- Thinking about sea level rise (SLR) and sustainability is important to keep in mind when developing alternatives and choosing/refining a refined alternative.
- How will the project look into the future (due to SLR specifically)?
- Organize the criteria by various potential project elements (tabular outline).
- It will be useful to have clear cut ways to look at alternatives (and the scope of those) in such a way that you have a positives/negatives/no impact.
- We need to define sustainability for this site. What are the goals in terms of sediment transport and hydrology?
- For instance, for a sustainable transport of sediment/water, we need to build the project in one way vs. another way if we could reduce surface water inputs to the watershed.
- Surface water division doesn't set goals (per se) for the runoff thresholds, but usually does the evaluation of hydraulics based on input flows as defined and evaluates projects to deal with impacts of those flows.

- Glad to hear Tom talk about the grand vision of looking at what is the right thing to do here. Anything that is proposed (that will work) will be expensive.
- The restoration at Howarth Park, including public access as well as restoration, allowed for a wider net of grant funding opportunities for the project. This project was well funded due to the linkages between those two functions of the project. This opportunity exists at Meadowdale as well.
- The County has the least number of opportunities to get access to the nearshore area compared to other counties, so this is a priority for MRC.
- There has been a loss of pocket estuaries (~90% Puget Sound-wide).
- The railroad has armored significant portions of the shoreline in the Sound (and particularly in the County).
- There is a huge potential for bringing in different grants, including “out of the box” ideas that could be useful to help fund the project based on opportunities presented.
- Trestle that will provide access, large opening that can be used to restore natural process. This would be ideal.
- MRC has County money, federal grants, foundation, citizen/scientist groups, NOAA, EPA, and U.S. Fish and Wildlife. A good number of contacts to call upon to assist with funding strategies.
- We have evaluated about 60 streams. These sediment issues for this system are not unique to the area.
- What this project will be doing can be used to inform work that others are doing.
- This is not the only stream that is utilized by Chinook. Whatever comes out of this project could potentially be a template for what could be done at other locations, i.e., M&R.
- Suggestions for data collection: zero information regarding stream gages for coastal streams (water levels/flows) in this area.
- The stream in the context of the other streams. What is a natural process vs. what is a “problem” that needs or can be fixed?
- Parks should have the right as the owner of the lower end of the stream, that some of the problems at this site are the result of what is going on in the upper portions of the watershed.
- Stratigraphy evaluation as part of sediment load estimate. Look for sediment loads upstream of the Gulch.

- There is a relatively high flow in the summers due to aquifer/groundwater input to the stream.
- Equilibrium tidal channel size should be included in the evaluation (which it will be).
- Jamie Bails (contact person) at Fish and Wildlife.
- Fish and Wildlife has regulations for spans to consider: approximately 20 feet. Check these as part of the modeling scenarios.
- Fish data are available for this stream from Todd, and it would be very useful to have that on hand for inclusion in the evaluation.
- Interested in the dynamics between small streams and coastal processes. Todd would be interested in contributing to these evaluations.
- It is a bummer to walk all the way down to the beach and then have the outlet closed. Folks do some dangerous things to get to the beach in these cases.
- Would like to see a separate passage for the creek and people. This would seem to be the most sustainable solution for the site.
- Use the park area as an additional area for habitat restoration. This area is viewed as wasted space in a lot of ways; perhaps it could be put to use in other ways. Since you have to hike in, the lawn area may not be used for sports or other types of activities that require you to carry things down into the lawn area.
- (Peter) Gradient would need to be a consideration when looking at the lawn area and what we can do in that area in terms of habitat restoration.
- (Paul) there are opportunities for wetland restoration with this project.
- Washington Water Trails is mainly interested in access to the beach. Access from the water up. Meadowdale is an overnight site for the state water trail (from the water side) and it does get used in this capacity. Folks will use the restrooms, but most folks use the beach for overnight camping. But they do utilize the upland areas of the site during visits.
- There are opportunities to utilize volunteers as part of that organization for this project.
- Separate the stream from the public access would be preferred.
- Doug would know what the access frequency is for the overnight site (follow up on this). Possibly 20 or so folks per year. There are more that stop at the site, but they don't overnight.

- Potential to increase higher elevation areas for overnight use may be useful.
- If you don't address water quality issues, this could decrease the ability of salmon to survive in the creek.

Summary of Discussion

- Separation of the creek and people is a primary concern.
- Take into account the influence of upland actions on the alternatives to the extent possible within this project.
    - Land Use Policies and enforcement of existing codes comes under the Planning and Development Services Division of the County. However the Parks Director and Parks Naturalist have been involved in discussions with PDS supporting policies to reduce downstream impacts. This study will consider upstream contributory flows and sediment impacts based on current policies.
- Consider SLR in terms of sea level rise as part of the sustainability discussion.
- Define sustainability for this project, as part of goals (BNSF considerations, track elevations, etc.)
- Washington Water Trails, Edmonds CC, adopt stream, and Tulalip Tribes could offer assistance and enthusiasm for this project.
- Ability to solve multiple issues with one alternative opens up more opportunities for funding.

ATTACHMENT 3
AGENCY/ORGANIZATION STAKEHOLDER PRESENTATION

(On File with Snohomish County Parks)

APPENDIX A-3
MINUTES: COMMUNITY STAKEHOLDER MEETING
12/15/2014

Minutes: Community Stakeholder Meeting

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Monday, December 15, 2014, 6:30 pm to 8:30 pm

Attendees

Snohomish County Staff

- Logan Daniels
- Sharon Swan
- Kathleen Herrmann
- Tom Teigen
- Doug Dailer, Park Ranger
- Tom Murdoch
- Frank Leonetti

Anchor QEA, Consultants

- Kathy Ketteridge
- Peter Hummel

Community Members

Introductions, Purpose of Meeting, and Overview

Logan introduced the Snohomish County staff and consultants. She explained that the purpose of the meeting was to obtain input on the evaluation criteria. Peter provided an overview of the agenda. A PowerPoint presentation for a portion of the meeting included a presentation of the preliminary evaluation criteria. Copies of the agenda and preliminary evaluation criteria list were provided at the front table.

Project History, Objectives, Scope, and Schedule

- Logan provided a brief overview of the project history and sediment conditions at the culvert that have led to the project.
- Logan presented an overview of the objectives of the project.
- Peter provided an overview of the schedule, the main tasks in the project scope of work, and the studies that will be conducted of the conceptual alternatives.
- The next public meeting will be held in April 2015, and the proposed completion date for the feasibility project is in May 2015.

Preliminary Evaluation Criteria, Questions and Answers, and Small Group Discussion

Peter presented the preliminary evaluation criteria and described how they will be used as a "funnel" for selecting the preferred alternative. A question and answer period followed, as briefly summarized in the following section. The meeting participants then broke up into five groups of approximately seven to ten people per group, and group leaders recorded their comments, which are provided below under "Evaluation Criteria Discussion Comments." Group leaders were Logan, Sharon, Kathleen, Kathy, and Peter. Following this discussion period, the group leaders provided a summary of their discussions to the assembled full group.

Question and Answer Period

Questions from the community stakeholders were addressed by County staff and the consultant team prior to the small group discussion. An overview of that discussion is provided below; questions and answers have been combined and/or paraphrased from the discussion.

- *Question*: What is the role of BNSF in this project? *Answer*: The County has brought in BNSF early on in this process, and they are aware of the project. The consultant team includes engineers from Shannon and Wilson and TKDA, who work with BNSF on a regular basis and are familiar with structures and construction methods acceptable to the railroad. BNSF will have an opportunity to review the preferred alternative. Safety is a core value of BNSF, and this project has the potential to improve public safety at this location.

- *Question*: How are impacts from development in the upper Lunds Gulch Creek Watershed being handled as part of this project? *Answer*: Increase in flows from upstream development (as documented by other studies completed by the County) will be included in the hydraulic analysis for sizing the potential new opening. However, specific impacts of development on the creek and watershed as a whole are not included in the scope of this project.

- *Question*: What can be done to improve park access in the short term? *Answer*: Continue existing operation and maintenance procedures for the outlet and continue to focus on finding a long-term solution (which is the objective of this current project).

Evaluation Criteria Discussion Comments

Evaluation criteria discussion comments were summarized by discussion group and by general topic; those are attached to these meeting minutes.

Next Steps and Meeting Adjournment

- Logan described the upcoming steps in the project including development of conceptual alternatives.

- Meeting Minutes and other project information will be posted on the County's website, and Logan provided that information.

Attachments

- Attachment 1: Revised Draft Evaluation Criteria
- Attachment 2: Community Stakeholder Presentation
  (on file with Snohomish County Parks)
- Attachment 3: Community Stakeholder Meeting Notes by Group
- Attachment 4: Community Stakeholder Meeting Notes by Topic
- Attachment 5: Comment Card Response

Meeting summary prepared by	*Peter Hummel and Kathy Ketteridge Anchor QEA, LLC*	*January 2015*

Communicate any discrepancies in these meeting minutes, in writing, to Kathy Ketteridge (kketteridge@anchorqea.com) within 7 days.

ATTACHMENT 1
REVISED DRAFT EVALUATION CRITERIA

Revised Draft Evaluation Criteria

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Public Safety

- Beach Access Across BNSF Right-of-Way

Support for Project

- Stakeholders
- Permitting Agencies

Parks and Recreation

- Pedestrian / ADA Access and Circulation
- Balance Public Access Opportunities with Habitat Protection
- Conversion of Lower Lawn Areas to Habitat
- Facility Relocation
- Operations and Maintenance
- Ability to Provide Suitable Use Areas for Current and Anticipated Programs and User Groups, including Education Uses
- Views

Sediment Transport and Coastal Processes

- Sediment Transport Capacity of Opening, for Creek Sediment Loads
- Potential for Channel Migration and Meandering
- Shoreline Wave and Erosion Affecting Park and Railroad
- Sediment Transport Distribution on Delta

Habitat Restoration

- Quantity and Diversity of Nearshore Habitat Waterward of Railroad Crossing
- Juvenile Salmon Fish Passage Conditions into Lower Creek
- Size of Transition Zone between Saline and Freshwater Habitats
- Quality of Lunds Gulch Creek Habitat
- Quantity and Quality of Riparian Vegetation along Stream and Nearshore
- Quality of Freshwater Wetland
- Habitat Connectivity for Non-fish Species

BNSF

- Consistent with Railroad Engineering Standards
- Constructible within BNSF Work Windows
- Meets BNSF O&M Standards

Funding Opportunities

- Probability to Obtain Grants
- Additional Fundraising and Partnership Opportunities

Sustainability

Cost/Benefit Considerations, Short- and Long-Term

ATTACHMENT 2
COMMUNITY STAKEHOLDER PRESENTATION

(On File with Snohomish County Parks)

ATTACHMENT 3
COMMUNITY STAKEHOLDER MEETING NOTES BY GROUP

Community Stakeholder Meeting Notes by Group

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Monday, December 15, 2014, 6:30 pm to 8:30 pm

Group 1: Logan Daniels, facilitator

- Trestle—get rid of tunnel (dirt support) with timber supports—provides more views
- (Doesn't like overpass)
- Trestle—aesthetic concerns for view sight
- Overpass won't solve salmon sediment issues
- Can we control sediment upstream?
- Separate tunnel for public sediment for other (water)
- Existing tunnel insufficient for anything
- Trestle:
    - Would improve riparian upstream
    - Would improve estuary downstream
    - Improve visibility
    - Improve aesthetics from railroad berm
    - Would allow for stream meander
- Concern for existing Americans with Disabilities Act (ADA) access
- Likes restoring marsh area
- Moving restrooms to east
- Eagle nests and all wildlife concern
- Does trestle option allow for two sets of tracks?
- Good PR for railroad cooperation
- Openness and access is important—is trestle the answer?
- Consensus is not to have overpass
- Consensus that public safety be a top priority
- Easy access will resolve public safety
- Marshland could be expanded if large opening
- Concern about marshland taking space
- Focus on habitat beach side
- Lawn area not fully utilized

- Relocate restrooms
- Site for public education environmental shortage of native habitat
- Concern over future change of ownership and who pays and maintains
- Concern about negative opposition
- Loves because hiking park is diverse
- Concern of how tidal ebb and flow will affect the park

Group 2: Sharon Swan, facilitator

Neighbor group

Wants:

- Long-term solution (but do it quick)—“done”
- Ensure public access to beach—helps protect stream
    - Separate access
- Culvert/passage-sized for water access
- Sediment problem—catch? With fish bypass?
    - But separate public access—no issue
    - If shared tunnel with public, need sediment control
- Fish enhancements/water passage improvements if high quality habitat, if brings money to project
- Not interested in park “remodel”
- 1° beach access 2° fish
- Estuary OK if part of the solution—it creates funding
- Some use of lawn—in winter wet
- Some use of picnic tables and grills
- Beach access point of park
- More trails?
- Funding possibility—Puget Sound Anglers

Group 3: Kathy Ketteridge, facilitator

- North Meadowdale Beach Road (1 block up from 76th)—groundwater inputs (notice sediment increase in last 4 years compared to previous 6 years)
- Mountain beaver (wildlife) impacted by population increase (pets)—human problem in this watershed—salmon habitat loss in Sound
- Work with natural process for runoff
- Trail redesign as switchbacks—runoff will not flow down trail during rain
- Starlight—pond filled in
- Hazard area designation makes it hard to develop

- Prone to slides from 52nd; Beverly Elementary School trees removed (erosion control?) due to development
- Encourage City to treat development in area carefully
- Drawing: An idea: Fill up elevation inside tracks

- Overpass—ADA (safety)
- Wetland inland and deepening culvert
  - Tides
  - Retaining pond
  - Inside tracks
- Pre-fabricated train bridge
- Need to fix upstream issue
- Sea level rise —real data! Can we look at it?
- Pedestrian tunnel and leave water tunnel alone
- Old marine—folks going over tracks—look at location where new little park is
- Parking (break-ins)
- Beach side emergency phone

Group 4: Peter Hummel, facilitator

- Need a sign to tell people not to block the stream
- Any endangered species in creek?
- Let BNSF help solve problem
- Concerned about beach access—few access points
  - Safe access, ensured
- Consider an over crossing and under crossing
- On water side, need to withstand waves, etc.
- How to look at developing —use what worked elsewhere
- High tides, storms, high flows impacts on both sides of railroad tracks
- Consider upstream development—impact on sediment and landslides
- ADA access – how to phase in

- Rather than over crossing—wider undercrossing for public; nice to see fish in creek
- Bridge over crossing—aesthetic and cost issue
- Wider railroad bridge or multiple tunnels for fish and people—more feasible
- More flows and sediment than there used to be
- Funding—find wealthy celebrity, sponsors, Macklemore
- How about trade-offs of lawn to habitat
- Consider track elevation to increase clearance
- Consider crossing creek further upstream
- Keep loop path but could be modified
- Lawn area—very wet, especially west of picnic shelter. People also use picnic tables—including west of shelter. People like the location in sun.
- Windy on water side of railroad
- Surfrider Foundation
- Acclimation ponds

Group 5: Kathleen Herrmann, facilitator

- Access—look at similar places with trestle, wheelchair access (e.g., Carkeek Park with ramp added and Picnic Point Park [little baby killed on tracks, bigger footprint])
- Drawing:

- Question: What fish are present?
- Add criteria: flexible with regard to runoff—stormwater
- Issue: cutting trees in watershed; Beverly Elementary School
- Emphasize: BNSF responsibility—part of problem and should be involved in solution
- Developers: should be responsible for impacts
- Question: How can wheelchairs negotiate the beach? What does complete ADA access mean? All-terrain qual
- Priority: human access to beach from park

- Idea: Second tunnel for people; engineer shallower tunnel
- Priority: reliable access to the beach
- Question: Is study encompassing entire park?
    - Sea level rise, optimal conditions for beach access
- Facility: parking at the top—not enough parking at the top of trailhead
- $5 million in conservation futures
- Criteria: emphasize ability to deal with increased runoff
- People love the park and want to get to the beach
- Stream quantity/quality
- Group ranked Evaluation Criteria as follows:
    - 1st Priority – Balance Public Access Opportunities with Habitat Protection (7 votes)
    - 2nd Priority – Public Safety re: beach access across BNSF right of way (5 votes), Quality of Lunds Gulch Habitat – (1 vote), All of the above (1 vote)
    - 3rd Priority – Ability to Provide Suitable Use Areas for Current and Anticipated Program and User Groups, including Education Uses (2 votes), Habitat Connectivity for non-fish species (1 vote), Juvenile Fish Passage Conditions Into Lower Creek – (1 vote), Quality of Creek Habitat (1 vote)

ATTACHMENT 4
COMMUNITY STAKEHOLDER MEETING NOTES BY TOPIC

Community Stakeholder Meeting Notes by Topic

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Monday, December 15, 2014, 6:30 pm to 8:30 pm

Parks and Recreation

1. Lawn area not fully utilized
2. Concern about marshland taking space
3. Moving restrooms to east
4. Relocate restrooms
5. Loves because hiking park is diverse
6. Concern of how tidal ebb and flow will affect the park
7. Site for public education environmental shortage of native habitat
8. Not interested in park “remodel”
9. Some use of lawn—in winter wet
10. Some use of picnic tables and grills
11. Beach access point of park
12. More trails?
13. Trail redesign as switchbacks—runoff will not flow down trail during rain
14. Beach side emergency phone
15. Need a sign to tell people not to block the stream
16. Parking (break-ins)
17. Consider crossing creek further upstream
18. Keep loop path but could be modified
19. Lawn area—very wet, especially west of picnic shelter. People also use picnic tables—including west of shelter. People like the location in sun.
20. Windy on water side of railroad
21. How about trade-offs of lawn to habitat
22. Question: How can wheelchairs negotiate the beach? What does complete ADA access mean? All-terrain qual
23. Facility: parking at the top—not enough parking at the top of trailhead
24. People love the park and want to get to the beach

Habitat

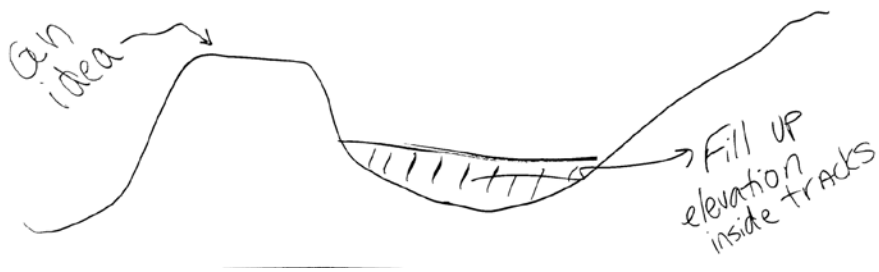
25. Overpass won't solve salmon sediment issues
26. Likes restoring marsh area
27. Marshland could be expanded if large opening
28. Focus on habitat beach side
29. Eagle nests and all wildlife concern
30. Stream quantity/quality
31. Fish enhancements/water passage improvements if **high quality habitat**, if brings money to project
32. Estuary OK if part of the solution—it creates funding
33. Wetland inland and deepening culvert
    - Tides
    - Retaining pond
    - Inside tracks
34. Mountain beaver (wildlife) impacted by population increase (pets)—human problem in this watershed—salmon habitat loss in Sound
35. Any endangered species in creek?
36. Question: What fish are present?

Railroad/Public Access

37. Concern for existing Americans with Disabilities Act (ADA) access
38. Trestle:
    - Would improve riparian upstream
    - Would improve estuary downstream
    - Improve visibility
    - Improve aesthetics from railroad berm
    - Would allow for stream meander
39. Does trestle option allow for two sets of tracks?
40. Trestle—get rid of tunnel (dirt support) with timber supports—provides more views
41. (Doesn't like overpass)
42. Trestle—aesthetic concerns for view sight
43. Separate tunnel for public, sediment for other (water)
44. Good PR for railroad cooperation
45. Openness and access is important—is trestle the answer?
46. Consensus is not to have overpass
47. Ensure separate public access to beach—helps protect stream

48. Culvert/passage-sized for water access
49. 1° beach access 2° fish
50. Overpass—ADA (safety)
51. Consensus that public safety be a top priority
52. Easy access will resolve public safety
53. Pre-fabricated train bridge
54. Pedestrian tunnel and leave water tunnel alone
55. Old marine—folks going over tracks—look at location where new little park is
56. Let BNSF help solve problem
57. Concerned about beach access—few access points
    - Safe access, ensured
58. Consider an over crossing and under crossing
59. On water side, need to withstand waves, etc.
60. How to look at developing—use what worked elsewhere
61. High tides, storms, high flows impacts on both sides of railroad tracks
62. ADA access – how to phase in
63. Rather than over crossing—wider undercrossing for public; nice to see fish in creek
64. Bridge over crossing—aesthetic and cost issue
65. Wider railroad bridge or multiple tunnels for fish and people—more feasible
66. Consider track elevation to increase clearance
67. Access—look at similar places with trestle, wheelchair access (e.g., Carkeek Park with ramp added and Picnic Point Park [little baby killed on tracks, bigger footprint])

68. Priority: human access to beach from park
69. Idea: Second tunnel for people; engineer shallower tunnel
70. Priority: reliable access to the beach
71. Drawing: An idea: Fill up elevation inside tracks



Sediment/Stormwater

72. Sediment problem—catch? With fish bypass?
    - But separate public access—no issue
    - If shared tunnel with public, need sediment control
73. Can we control sediment upstream?
74. North Meadowdale Beach Road (1 block up from 76th)—groundwater inputs (notice sediment increase in last 4 years compared to previous 6 years)
75. Work with natural process for runoff
76. Starlight—pond filled in
77. Need to fix upstream issue
78. Funding possibility—Puget Sound Anglers
79. More flows and sediment than there used to be
80. Consider upstream development—impact on sediment and landslides
81. Acclimation ponds
82. Add criteria: flexible with regard to runoff—stormwater
83. Criteria: emphasize ability to deal with increased runoff

Other Considerations

84. Concern over future change of ownership and who pays and maintains
85. Concern about negative opposition
86. Long-term solution (but do it quick)—"done"
87. Hazard area designation makes it hard to develop
88. Prone to slides from 52nd; Beverly Elementary School trees removed (erosion control?) due to development
89. Encourage City to treat development in area carefully
90. Developers: should be responsible for impacts
91. Funding—find wealthy celebrity, sponsors, Macklemore
92. Issue: cutting trees in watershed; Beverly Elementary School
93. Emphasize: BNSF responsibility—part of problem and should be involved in solution
94. Surfrider Foundation

95. Question: Is study encompassing entire park?
    - Sea level rise, optimal conditions for beach access
96. $5 million in conservation futures
97. Sea level rise—real data! Can we look at it?

ATTACHMENT 5
COMMENT CARD RESPONSE

Meadowdale Beach County Park Feasibility Study

Comment card:

The whole issue is that we have little or no beach access in a beach park. You have proven that signs and fences will not keep people from crossing the tracks, so it all boils down to safety. How can community members develop the criteria—we don't have all the facts. Seems to me the only logical solution is one tunnel for people and leave the existing tunnel to the fish.

APPENDIX A-4
MINUTES: AGENCY/ORGANIZATION STAKEHOLDER MEETING NO. 2
5/4/2015

Minutes: Agency/Organization Stakeholder Meeting No. 2

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time:	Monday, May 4, 2015, 10:00 am to 12:00 pm
Location:	Willis Tucker Park Administration Bldg. 6705 Puget Park Drive, Snohomish, Washington Gary Weikel Room

Attendees

Snohomish County Staff

- Logan Daniels
- Sharon Swan
- Kathleen Herrmann
- Tom Teigen
- Doug Daylor, Park Ranger
- Tom Murdoch
- Frank Leonetti

Anchor QEA, Consultants

- Kathy Ketteridge
- Peter Hummel

Confluence Environmental, Consultants

- Paul Schlenger

Organization/Agency Members

- See attached sign-in sheet (Attachment 1)

Introductions, Purpose of Meeting, and Overview of Project Purpose and Progress

Logan introduced the Snohomish County Staff and consultants. Organization/Agency participants each introduced themselves to the group. Logan explained the purpose of the meeting was to obtain input on the proposed alternatives.

Overview of Meeting Agenda

Peter went over the meeting agenda and explained that comments from the attendees would be gathered from a round-table discussion, where each participant would be given an opportunity to provide their input. He let participants know that Kathy would be recording the comments for inclusion in the meeting summary.

Presentation of Proposed Alternatives

Peter presented the three proposed alternatives, which were shown on boards in the meeting space and on the screen as part of the PowerPoint presentation. Plan and section views for each of the three proposed alternatives are provided in Attachment 2, which is the PowerPoint presentation shown during the meeting. Peter also provided a brief summary of the comments received during the Community Stakeholder Meeting #2.

Overview of Studies Conducted for the Project

Kathy provided an overview of each of the studies completed as part of the project (to date). A list of the studies is provided with the PowerPoint presentation shown in Attachment 1. Some of the studies were discussed in more detail, including: Cultural Resources, Environmental Phase 1, Geotechnical Evaluation, Creek and Coastal Studies, BNSF coordination and Parks and Recreation. Summary talking points for the studies are also provided in the PowerPoint presentation provided in Attachment 2.

Round-Table Discussion of Proposed Alternatives

The hour set aside for the round-table discussion was divided up equally between the organization/agency attendees, and each person was given about 5-6 minutes to provide their input on the alternatives and ask questions in turn. Kathy recorded comments and questions by typing them into the PowerPoint (shown on the screen during the discussion). Recorded comments and questions (with County and consultant team provided answers) are provided (by speaker) as Attachment 3. Similar to the community stakeholder meeting responses, the majority of the attendees preferred Alternative 3.

Next Steps

Logan described the upcoming steps in the project, including a County meeting to facilitate selection of the preferred alternative. Meeting minutes and other project information will be posted on the project website; information on the website is provided in the last slide of the PowerPoint presentation (Attachment 1)

Attachments

- Attachment 1: Sign-in Sheet (on file with Snohomish County Parks)
- Attachment 2: Agency/Organization Stakeholder Meeting Presentation (on file with Snohomish County Parks)
- Attachment 3: Recorded Comments and Questions/Answers

Meeting summary prepared by	*Peter Hummel and Kathy Ketteridge Anchor QEA, LLC*	*May 2015*

Communicate any discrepancies in these meeting minutes, in writing, to Kathy Ketteridge (kketteridge@anchorqea.com) within 7 days.

ATTACHMENT 1
SIGN-IN SHEET

(On File with Snohomish County Parks)

ATTACHMENT 2
AGENCY/ORGANIZATION STAKEHOLDER PRESENTATION

(On File with Snohomish County Parks)

ATTACHMENT 3
RECORDED COMMENTS AND QUESTIONS/ANSWERS

Round Table Discussion Notes: Agency/Organization Stakeholder Meeting No. 2

Duane Uusitalo (Brackett's Landing):

- North side of the park there was a development called Seabrook Heights. It was fought starting in 2005. Development was stopped and property purchased by City of Lynnwood; it will not be developed.
- Key issue with park is that impacts from that development would be additional slides in the park.
- Question from earlier meeting: Did modeling show that the amount of gravel moving down stream could be managed by the opening?
- Even if you take the largest alternative (3) and you get a bigger pocket estuary – like idea- but with gravel moving down – the gravel has to move through there. Larger bridge would allow gravel to pass through.
- But, with gravel continuing to be transported down creek – the gravel could build up above the bridge and the pocket estuary will become "gravel deposit". But the beach itself could be raised up.
- Not sure how the hydraulics will take place. Would like to have this explained/discussed…
- Another positive – Chinook coming in to the creek – coming from other streams into this system.

Thomas Murphy (Edmonds Community College)

- Positive development to put effort into solving the issues at the site. Human use of the area – dangerous to use the culvert to get to beach.
- Needs to be opened up and need ability for sediment to move through the system
- Expanding the natural area – more robust pocket Each proposal is improvement over what we have now
- Most excited by option 3 that has the most natural area added and most ability for sediment to move through
- Has the most potential to impact cultural resources, if present on site
- ECC faculty and students are interested in being involved in the process; students (projects) – learning opportunity for the students
- When in planning process, would like to be involved when those chances arise

- We also have technical skills that could be of assistance to the project (non-volunteer). Archeology, fish and wildlife monitoring (some volunteer opportunities. for this), interpretive materials contribution.
- (Neal) Students would love to be involved in the project.
- (Kacie) getting rid of some of the lawn sound ok
- Is anyone going to be upset about removal of the sand volleyball court?

Carrie Hite (City of Edmonds)

- Which of these options would be the best option for fish habitat moving upstream?
- SRFB interested in Chinook; so would be a boon for funding opportunities
- Likes the restored habitat for Alt 3 – closest to what it probably was before impacted

Tom Teigen (Snohomish County Parks).

- Alt 3 – project is a once in a generation chance
- Could address the long term sustainability of the site; Alt3 would be the best of the three for this as well as increasing habitat, passing sediment and getting park visitors to the beach
- County and city continue to work together to buy property in the watershed to preserve space Snohomish County through Conservation Futures contributed 5 million towards purchase of Seabrooke Heights

Logan Daniels (Snohomish County Parks)

- Just to clarify the preferred alternative will be selected after we synthesize all input from public and agency stakeholders.
- Once preferred alternative is selected, county will schedule meeting with BNSF . Meeting to likely occur end of May, first part of June.
- County will be meeting with Lynnwood – to discuss opportunities for possible other trailheads located on City-owned property to potentially alleviate some of the parking issues at the park.

Kathleen Herrmann (Snohomish County Marine Resource Council)

- Public access to salt water areas in the County. There are not as many as other counties – so this is important issue for the MRC.
- Ability to improve pocket estuary habitat for salmon.
- Kathleen is also working with BNSF on the nearshore project (north of this site)

Sharon Swan (Snohomish County Parks)

- Is concerned with the cost of Alt 3 – in terms of costs and benefits.
- What is likelihood of future expandability of the designs that have smaller openings?
- Would argue for meeting full ADA standards, even if walkway becomes wet at times (high flows, king tides)
- Wants to ensure park experience commensurate with public desire east of railroad berm

Bill Lider (Sno-King Watershed Council)

- SK WS Council was opposed to the Seabrook Heights development (that has since been stopped and purchased)
- Sierra club – walked with them through gulch to look at slide areas
- Remove all of the lawn; no need to maintain it. (fertilizer, etc. not needed in system)
- Restore it to natural habitat that everyone seems to like for the site
- County has obligation to address storm water management practices to reduce storm water run-off
- Concerned there was no PE stamp on the hydraulic study
- Concerned with small flows that may cause more severe concerns than the largest flows
- The storm water retention structure upstream in the basin was also designed using older standards
- For these reasons, feel that letting the sediment transport into Sound will not be enough to protect the creek and watershed
- Developments upstream designed to old stormwater standards
- Request county tap into storm water management funds to:

  Purchase property in the basin that is currently undeveloped (10-acre site Edmonds School District)
- Storm water retro-fits; take money from Salmon Recovery
- Funds or tax benefits to retro-fit storm water inputs from upstream
- LID upstream
- Longer duration more frequent flow events are a concern
- Instead of having a small gravel plug will have a large gravel plug.
- This will have a detrimental impact to salmon habitat
- Concerns of the constructability of trestle in 6 – hour work windows.
- Concerned that the BNSF will not go along with this project.
- Tunneling through the railroad berm should be considered. Less expensive?

Todd Zackey (Tulalip Tribes)

- Upland watershed is an issue
- Did we do a tidal dynamic run?
- Good to hear natural design for the park. Outdoor education – exposing kids to natural systems
- Parks should push angle for natural systems
- Cost differences between Alt 1 and Alt 3?
- Would be more in favor of Alt 3; more habitat
- If and when the project happens, would want to set up a monitoring program. There is a lot of value in learning from the project to see how it reacts.
- Have we applied for SRFB funding yet?

Mike Ehlebracht (Snohomish County Marine Resource Council)

- From the MRC point of view; alt 3 would be the most desirable.
- This is a unique opportunity
- Questions about costs and benefits, but if it is affordable would be a desirable outcome
- As a user of the park, I don't go there to play volleyball - thought the lawn was not a good use of space in this park
- Should enhance natural environment
- Also, security concerns about going through the tunnel
- Greater visibility to the beach
- In terms of the amount of sediment load coming down the stream; what would the sediment load be naturally in the system (prior to any development)?
- How long will it be before you need to do major maintenance on the system

Barbara Ingram (Friends of Meadowdale Park Facebook Page)

- Observes frustration of park users attempting but unable to reach the beach because the culvert is flooded almost every day in winter and spring.
- Primary objective: get people to the beach, and maintain a healthy salmon habitat.
- Likes alternative 3: wider opening allows sediment and gravel to move into Puget Sound without obstructions. People will have better, not wetter access to the beach, and salmon will have easier access between Lunds Gulch and Puget Sound for spawning and rearing.
- Safety issue - people are crossing railroad tracks more frequently - because culvert is flooded.
- Alt 3 is most sustainable in terms of sea level rise.

- Erosion of hillsides is a natural process. Stormwater runoff from development and its negative impacts should be studied but not as part of this project which from the beginning established clearly defined goals and objectives.
- Like changing lower meadow into an estuary with platform walkway above it or viewing areas for observation of fish and wildlife that will enhance the public's connection to nature and provide educational opportunities for all. Need more educational opportunities at Meadowdale Beach Park.
- Ensure that ADA requirements are considered/met; access in the dry important even in winter
- More native plants, getting rid of ivy to improve riparian zone and salmon/wildlife habitat.

QUESTIONS ANSWERD

Logan Daniels (Snohomish County Parks)

- Pesticide use: none used, not in our current practice at this location. .. Public uses lawn when uses picnic shelter.
- BNSF support for project:

  County has had discussions in past with RR which resulted in them just wanting to see a feasible design

  County required a vetted railroad consultant that had a good working relationship with BNSF for this project.

  May be mitigation banking opportunity to work with them.

  Safety is big issue for RR. Met with BNSF about fencing in February and discussed trespass concerns with them.

  Most derailments occur due to braking when pedestrians are observed on tracks, a derailment of a coal train would be an ecological disaster

  They have previously indicated that a trestle designed according to their standards would be preferable.
- Last public meeting input:

  Volleyball court could go

  There was an overwhelming consensus for Alt 3 especially focusing on the larger habitat restoration; but did have concerns about costs and funding ability
- A few comments came back in favor of Alt 1 based on cost concerns, concerns over coastal impacts (sea level rise) to park, and preference for keeping more lawn ADA requirements; permitting concerns if not met we do have constraints due to vertical structure from railroad
- Cost for bridge spans shown for Alt 1 and Alt 3 $700k to $1.2 million difference. Total cost is around $8.7 million (design and construction) – rough estimates
- Grant funding for design only: Site visit last Wednesday (4/29). Final application in August, decide grants in December.

Paul Schlenger (Confluence Environmental)

- Two reviewing groups; state sends two reviewers that give thumbs up or down. Local reviewers dictate where funding goes.
- Frank L. said it was very well received. Awareness of working with BNSF; challenges there.
- Really liked the equitable split of funding/matching

Logan Daniels (Snohomish County Parks)

- This project is focusing on the park and what can be done within the park boundary on safety – access to the beach for humans, fish and sediment
- The railroad impacts preceded the creek flow and sediment impacts.
- Scope of this project did not include a full watershed study in terms of stormwater and HSPF-type studies with in the watershed.
- This study used existing County watershed modeling for feasibility issues.
- There were a large number of issues requiring specific studies to explore to determine feasibility of the project
- The estuary will be a very dynamic system but will more closely mimic what could have occurred without the railroad embankment the system returned to natural process will change over time depending on sediment load and flows.
- The County is a downstream property owner within the watershed and therefore has a vested interest in what happens upstream and will continue to support programs that will protect the gulch.

Kathleen Herrmann (Snohomish County Marine Resource Council)

- Surface water management – Meadowdale Park is within unincorporated portions of the county.
- Perform a new study to look at stormwater management in County – focusing on Lund's Gulch watershed
- Good start to address storm water questions

Tom Teigen (Snohomish County Parks)

- This project is about people and environment
- This has been an issue for a while; now funds are being put into developing a solution.
- Public opinion is important – even for BNSF.
- Meadowdale will be going in to Sunset magazine
- There is momentum behind this project right now, including political will; opportunities with and for BNSF given their current environmental focus, safety issues and their previous comments of just present them with a viable design, and great potential for funding possibilities due to the scope and nature of the project.

APPENDIX A-5
MINUTES: COMMUNITY STAKEHOLDER MEETING NO. 2
4/20/2015

Minutes: Community Stakeholder Meeting No. 2

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Monday, April 20, 2015, 6:30 pm to 8:30 pm

Location: Meadowdale High School, 6002 168th St SW, Lynnwood, WA 98037

Attendees

Snohomish County Staff

- Logan Daniels
- Kathleen Herrmann
- Tom Teigen
- Doug Dailer, Park Ranger

Anchor QEA, Consultant Team

- Kathy Ketteridge, Anchor QEA
- Peter Hummel, Anchor QEA
- Paul Schlenger, Confluence

Community Members

- Community Participants (approximately 40)

Meeting Agenda

1. Introductions, Purpose of Meeting

Logan introduced the Snohomish County Staff and consultants. She explained the purpose of the meeting was to obtain input on the proposed alternatives.

2. Overview of Meeting Agenda

Peter went over the meeting agenda and explained that input from the attendees would be obtained in small group sessions following an upfront presentation of the proposed alternatives and completed draft studies.

3. Presentation of Proposed Alternatives

Peter presented the three proposed alternatives, which were shown on boards in the meeting space and on the screen as part of the PowerPoint presentation. Plan and section views for each of the three proposed alternatives are provided in Attachment 1, which is the PowerPoint presentation shown during the meeting.

4. Overview of Studies Conducted for the Project

Kathy provided an overview of each of the studies completed as part of the project (to date). A list of the studies is provided with the PowerPoint presentation shown in Attachment 1. Some of the studies were discussed in more detail, including: Cultural Resources, Environmental Phase 1, Geotechnical Evaluation, Creek and Coastal Studies, BNSF coordination and Parks and Recreation. Summary talking points for the studies are also provided in the PowerPoint presentation provided in Attachment 1.

5. Small-group Discussion of Proposed Alternatives and "Report Back" on discussion

The attendees were divided up into small groups (less than 10 individuals per group) and each group had a facilitator from Snohomish County staff (Logan and Kathleen) or the Consultant Team (Peter, Kathy, and Paul) assist with the discussion and answer questions, as needed. Each facilitator recorded comments from the attendees during the small group discussion. These comments are provided (by facilitator) as Attachment 2. Comment card responses provided by attendees are summarized in Attachment 3. The majority of the attendees preferred Alternative 3.

6. Next Steps and Meeting Adjourned

Logan described the upcoming steps in the project, including a second organization/stakeholder meeting and County meeting to facilitate selection of the preferred alternative. Meeting minutes and other project information will be posted on the project website; information on the website is provided in the last slide of the PowerPoint presentation (Attachment 1)

Attachments

- Attachment 1: Community Stakeholder Presentation
  (on file with Snohomish County Parks)
- Attachment 2: Community Stakeholder Meeting Notes by Group
- Attachment 3: Comment Card Responses

Meeting summary prepared by	*Peter Hummel and Kathy Ketteridge Anchor QEA, LLC*	*April 2015*

Communicate any discrepancies in these meeting minutes, in writing, to Kathy Ketteridge (kketteridge@anchorqea.com) within 7 days.

ATTACHMENT 1
COMMUNITY STAKEHOLDER PRESENTATION

(On File with Snohomish County Parks)

ATTACHMENT 2
COMMUNITY STAKEHOLDER MEETING NOTES BY GROUP

Community Stakeholder Meeting No. 2 Notes, by Group

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Monday, April 20, 2015, 6:30 pm to 8:30 pm

Peter Hummel, facilitator

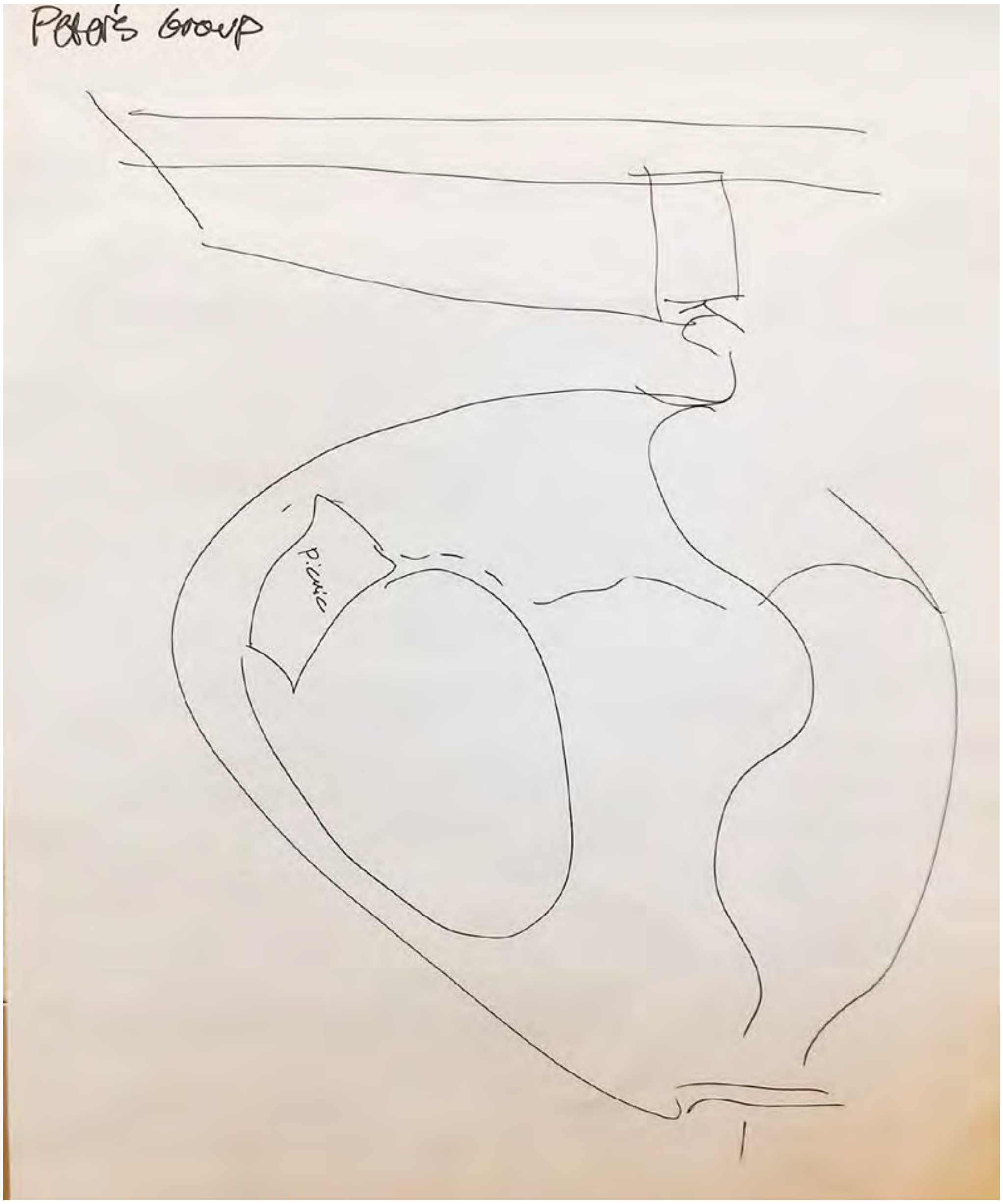
Sheet 1

- Is lawn to habitat, direct correlation
- Mix and match clearance for pedestrian walkway
- How is the lawn used and how often?
- Like the idea of smaller lawn and more habitat (Alternative 3)
- Concur with prior bullet item: like the Alternative 3 habitat
- Noise: when building a bridge
    - Will train horns be required?
    - Would like to minimize horns
    - Like Alternative 3– largest opening, less lawn OK
- Can BNSF pay?
- Like Alternative 1 – least cost
- Like Alternative 3 – best habitat and sediment passage

Sheet 2

- Like Alternative 1 – keeping more lawn
- (Park user) usually walking to the beach
- Alternative 2 is least desirable; Alternative 3 is the best over the long term: opening size, fish, and views
- More picnic sites is better
- Like Alternative 1 – more protected from tides
- Like gravel path, north side
- Like Alternative 1 – cheaper, railroad would like, Alternative 3 – railroad (may have issues with it)

Drawing on Un-numbered Sheet



Kathy Ketteridge, facilitator

Sheet 1

- Most folks avoid the western lawn
- Most folks just want to get to the beach
- Put more picnic tables at the beach since access will be better
- Lawn is important, but need to have more habitat
- Views are important – picnic spots
- Boardwalk could be useful for public

- Want to know costs!
- Larger habitat with smaller opening
- Picnic tables – folks use them, but shading is not ideal
- Walking loop is important
- Park is a hike, so not like a typical park where folks bring coolers, etc.
- Picnic areas – sunny locations are better!
- Volleyball court could be moved to beach
- Like the larger opening (Alternative 3)
- Improve the lawn
- Coho populations have fallen in the creek, chum are doing OK
- Alternative 2 – pro/dynamic
- Boardwalk through wetland for bird watchers
- The culvert does get impacted by high water now – bottom is at approx. 9 feet – check drawing
- Two reasons to go to the park: the walk/hike, and the beach

Logan Daniels, facilitator

Sheet 1

- Time frame and cost
- Parking
- High-flow bypass – route to Sound
- What about the problem upstream?

Sheet 2

- Get rid of lawn altogether
- Leave some lawn
- Most important aspect is the beach
- Alternative 2 – the creek would want to go back into the tunnel
- Volleyball court can go
- Note that concerned about picnic views
- Alternative 3 is preferred but concern for cost

Paul Schlenger, facilitator

Sheet 1

- Water and sediment on path
- Cost
- Want something that lasts
- Alternative 3 gives room for creek meandering
- Alternative 2 maintenance trouble – culvert

- Sea level rise sustainability
- Want space for birds/wildlife that marsh/wetland would provide
- Lawn upstream of the picnic area is often wet
- Keep volleyball somewhere
- Need to recognize that there will be trails created along the north even if not part of the design
- Wide riparian zone for salmon – good
- Favor habitat over recreation

Sheet 2

- Alternative 3 – room for change over time, e.g., sediment
- Life cycle cost – Alternative 3 sustainability provides value
- More maintenance-free, the better
- Alternative 2 creek bend problematic over time
- More space lessens the likelihood for trampling
- When did the culvert go in? In 20 years would it need to be replaced?
- Do it once, do it right
- No one uses horseshoes
  - Sometimes volleyball
  - The lawn is rough (mole hills), not easy to run on
  - Picnic area is used often
- Big investment of Alternative 3 still a value
- Big lawn not needed

Sheet 3

- Alternative 3 less lawn maintenance, more bird viewing
- Playground could add use by kids, but not wanted instead of Alternative 3
- Want a project that doesn't need to be redone in 20 years
- Park usage statistics – increasing over time
- Passive park – lessen lawn maintenance
- Increased park use leads to railroad crossing safety issues that this project needs to address / will address

Kathleen Herrmann, facilitator

Sheet 1

What is County priority?

Q: Alternative 1

- Not that concerned about view/height; concerned about access
- Community park will be key over the next 50 years
- Once you are on the beach, you have a view

- Folks aren't big on Alternative 2 – don't want to walk in the tunnel
- BNSF – What's the cost of Alternative 1 vs. Alternative 3?
- What about BNSF buy-off?

Sheet 2

- What about a "Bradley bridge," which was used in wars?
- Good to have double track by park
- Regarding lawn: only one part of it is sunny; people would rather go to the beach for views, rain or shine
- The lawn is a swamp; the lawn is a waste – better to have a pond for fish
- Reduce lawn for habitat and leave a bit for picnic shelter
- What about building a platform (at the north end regrade / dead end trail) for a view on Alternative 1?

Sheet 3

- What about a boardwalk with big pilings, to allow the stream to flow and people to walk?
- Lots of good County folk / expertise working on this – what do we think?
- Can/should we put pressure on BNSF/Berkshire Hathaway to participate?

Sheet 4

- Seen people with strollers crossing the railroad tracks
- Some people put rocks on the tracks
- Public safety issues
- Folks like Alternative 3: better views, better access, more habitat, allows flexibility

Sheet 5

- Who are other agency partners?
- Has sediment load changed recently?
- Where was new conservation land approx. 13 acres bought? (Lynnwood?)
- If the lawn is being kept, it needs to be regraded because it is a swamp
- Regarding dead-end path: keep the picnic area and remove trees/foliage to keep open view, to keep personal safety

Sheet 6

- 6.5-foot vs. 6-foot clearance difference is inconsequential
- How long will it take for native plants to come in after restoration?
- What is the timeline for constructing this project?

ATTACHMENT 2
COMMUNITY STAKEHOLDER MEETING NOTES BY GROUP

Community Meeting No. 2 Comment Cards

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Monday, April 20, 2015, 6:30 pm to 8:30 pm

Comment No. 1

"Very well-facilitated discussions; great information and visuals – thanks!"

Comment No. 2

"Good options on more riparian zone for salmon habitat."

Comment No. 3

"My first meeting on this; great surprise on how developed it is. Good luck, and keep it going!"

"I would like to be more involved! Let me know what I can do."

"I suggest putting BNSF/Berkshire under pressure."

Comment No. 4

"Alternate 1 sounds good (the best); thanks."

APPENDIX B
HYDRAULIC AND SEDIMENT ANALYSIS OF LUND’S GULCH CREEK MEMORANDUM

1605 Cornwall Avenue
Bellingham, Washington 98225
Phone 360.733.4311
www.anchorqea.com

MEMORANDUM

To:	Logan Daniels, Snohomish County Parks and Recreation	**Date:**	August 26, 2015
From:	Kathy Ketteridge, Anchor QEA, LLC	**Project:**	140723-02.01
Cc:	Peter Hummel, Anchor QEA, LLC		
Re:	Meadowdale Beach County Park Feasibility Study – Hydrology and Hydraulics Evaluation		

PURPOSE OF STUDY

The hydrology and hydraulics evaluation was conducted to evaluate the minimum opening required to convey estimated sediment loads predicted for Lund's Gulch Creek and to evaluate the relative hydraulic performance of proposed alternatives for creek flow conveyance. Alternatives were developed cooperatively with Snohomish County (County) staff and utilized input gained from public and stakeholder meetings conducted as part of this project. Plan views and sections of the proposed alternatives are provided herein as Attachment A. Proposed alternatives were evaluated to determine the water surface elevation and inundation upstream of the opening for high flows, potential for sediment transport through the opening, and upstream extent of impact on water surface elevations.

Specific analyses summarized in this memorandum include the following:

- Hydrology in Lund's Gulch creek
- Size of minimum opening to provide sediment transport through the opening
- Hydraulic analysis of proposed alternatives
- Sustainability of proposed alternatives

HYDROLOGY

A range of high flows in Lund's Gulch Creek was used to assess sediment transport capacity and flood stage through the Meadowdale Beach County Park (Park) and the proposed bridge openings for each conceptual alternative. Discharges in the creek associated with a number of return periods were taken from the *Puget Sound Tributaries Drainage Needs Report*

(Snohomish County 2002). Snohomish County utilized a Hydrological Simulation Program-Fortran (HSPF) model to estimate extreme discharge volumes in Lund's Gulch Creek.

Output from the County's HSPF model for 2-year, 10-year, 25-year, and 100-year storm flows at the mouth of Lund's Gulch Creek for existing and future predicted flows are shown in Table 1. Some land use alterations[1] have occurred since the date of the report that will likely reduce future runoff within the basin; however, the future values as stated in the 2002 report are still used as the baseline hydrology for this evaluation as a conservative value for analysis.

Additional flows higher than the 100-year storm flow (Snohomish County 2002) were also used in this evaluation in order to take into account uncertainties in predicted hydrology modeling and maintenance issues associated with upstream stormwater control systems, as well as future conditions associated with climate change[2] and unanticipated development. An upper bound for hydrology used in the evaluation was taken from previous hydrology developed for the Lund's Gulch Basin in 1989 (Snohomish County 1989). Flows reported in an earlier study at the mouth of Lund's Gulch ranged from 94 cubic feet per second (cfs) for a 2-year peak flow to 361 cfs for a 100-year peak flow. The difference between flow rates in the 2002 study versus the 1989 report is primarily due to construction of stormwater detention infrastructure upstream of the site at 52nd Avenue.

In the absence of additional run-off modeling to bound uncertainty in modeled hydrology or evaluate potential increase in creek flows due to climate change scenarios, a number of additional high discharges were used in the assessment. These discharges range from a factor of safety of 1.5 applied to the HSPF 100-year storm flow to a factor of safety of 1.5 applied to the previous 100-year flow in the creek estimated in the 1989 basin report from the County. The additional high discharge value of 550 cfs was used as an upper bound for this feasibility evaluation. The purpose of including an upper bound for creek hydrology in the evaluation is to ensure that all proposed alternatives have the ability to convey higher flows and associated

[1] For example, a 13-acre parcel of land that was assumed to be developed when the drainage needs report was completed has been recently purchased by the City of Lynnwood with Conservation Futures funding for the purpose of maintaining natural spaces.
[2] Climate change studies for this region generally predict that winter precipitation will increase in the future due to climate change in the region (U.S. Global Change Research Program 2009).

sediment loads that may occur in the future without additional modifications to the opening once constructed.

Table 1
Assessment Discharges

Peak Flow Event	Discharge (cfs)
2-year[a]	57
10-year[a]	89
25-year[a]	106
100-year[a]	135
Additional High Discharges	200
	300
	400
	550

Notes:
a. Taken from Snohomish County 2002
cfs = cubic foot per second

MINIMUM OPENING EVALUATION (HYDRAULICS)

The 1-D hydraulic model HEC-RAS developed by the U.S. Army Corps of Engineers (Brunner 2010a, 2010b) was used to estimate hydraulic conditions in Lund's Gulch Creek as part of this study. The HEC-RAS model was developed for the Lower 1,900 feet of Lund's Gulch Creek using existing site topography data, hydrology (see Table 1), and tidal information (see Appendix H of the Feasibility Report). The model output includes predictions of water surface elevations, cross-sectional-depth-averaged velocities, and bed shear stresses at identified cross-sections along the creek alignment.

The HEC-RAS model geometry representing existing conditions in Lund's Gulch Creek was developed using topography data from a bare earth digital elevation model (DEM). This DEM was generated from airborne Light Detection and Ranging (LiDAR) data provided by the Puget Sound LiDAR consortium and collected between 2005 and 2006 (see Attachment B). The DEM was then brought into ArcGIS and cross-section lines were created along Lund's Gulch to capture changes in channel gradient, with the spacing of cross-sections varying in proportion to planform complexity of the channel and floodplain. Figure 1 provides a schematic of the model, including the creek alignment and section locations. Manning's n values for the main channel and floodplain roughness were estimated based on similar values for a gravel to cobble bed stream with a forested floodplain. Additional roughness due to wood loading was added in the upper forested reach beginning upstream of Station 4+00 (Te Chow 1959). The Park floodplain was modeled with roughness conditions similar to a grass swale. Roughness values were the same for all alternatives and were set to 0.055 for the forested reach of the main channel, 0.045 for the estuary reach of the main channel, 0.075 for the forested/marsh floodplain, and 0.02 for the grass floodplain.

The model was used to determine the minimum opening under the railroad berm needed to support transport of sediment loads from Lund's Gulch Creek (see Appendix C of the Feasibility Report) through the opening and out onto the beach delta. It is difficult to predict with precision the width and thalweg elevation of the creek channel (or channels) that could form under a more natural unconfined creek system. Therefore, the sediment transport capacity of the proposed opening was characterized by changes in bed shear stress along the channel alignment for a channel of uniform depth (no low-flow channel). Bed shear stress is a force (per unit area) that the flow in the creek exerts on the creek bed sediments; the higher the bed shear stress the higher the potential for sediment movement. The model was used to evaluate potential bed shear stresses along the creek alignment for flows ranging from 135 cfs to 400 cfs (see Table 1) for the existing culvert/tunnel, and for openings sized at 20 feet, 30 feet, and 40 feet. Each of the model simulations was conducted using steady flow with mean higher high water[3] (MHHW; 9.0 feet North American Vertical Datum of 1988 [NAVD88]) as the downstream water surface elevation. Figures showing model-predicted water surface elevations and bed shear stresses along the channel alignment for existing conditions, and the 20-foot and 30-foot openings, are provided in Figures 2, 3, and 4, respectively.

The results of this model evaluation illustrate that the existing culvert causes the creek to backwater at higher flows (Figure 2), which reduces the bed shear stress just upstream of the culvert location. This causes sedimentation just upstream of the culvert, as has been observed at the site. The model results for the 20-foot opening (Figure 3) show no backwatering (and no decrease in bed shear stress) for flows up to 300 cfs. At 400 cfs, the

[3] Tidal datums are based on NOAA Gage No. 9447130; additional information on tidal water levels at the site is provided in the Coastal Analysis Study.

creek begins to backwater and bed shear stress is reduced upstream of the opening. For the 30-foot opening (Figure 4) the model results show that the opening does not cause backwatering or decreases in bed shear stress for all modeling flows up to 400 cfs. Based on this evaluation, a 20-foot opening would provide adequate sediment transport capacity through the opening during higher flows up to 300 cfs. A 30-foot opening would be required to provide sediment transport capacity through the opening for flows up to 400 cfs.

ALTERNATIVES EVALUATION

Three alternatives for the project were developed in cooperation with the County, the public, and project stakeholders (see Attachment A).[4] The alternatives include replacing the existing culvert under the railroad berm with a three- or four-span bridge. Four model geometries were developed using the HEC-RAS model of Lower Lund's Gulch Creek to represent existing conditions in Lund's Gulch and the proposed conditions for each of the three alternatives. Model simulations were conducted for each model geometry over the range of high flow events show in Table 1 for both MHHW (9.0 feet NAVD88) and highest astronomical tidal (10.7 feet NAVD88).

Geometry of Structures in the Model

The existing conditions model uses the HEC-RAS culvert function to model the existing culvert/tunnel based on inlet conditions, culvert geometry, roughness, and the upstream and downstream cross-sections. The proposed conditions models use the HEC-RAS bridge function to model proposed openings based on inlet conditions, bridge geometry, bottom roughness, pier energy losses, and the upstream and downstream cross-sections. In all model geometries, ineffective flow areas and channel banks were estimated from LiDAR data, aerial imagery, and site visits.

The existing box culvert opening was modeled using available information (Snohomish County 2002) and field measurements with a constant bottom and sidewall roughness across the range of assessment discharges (Table 2).

[4] The Feasibility Report will include a reference callout to the section in the report where alternatives development is documented.

Table 2
Existing Box Culvert Opening Input Summary

Culvert Geometry (H by W)	6 by 6 feet
Low Flow Fishway Geometry (H by W)	1 by 4.5 feet
Upstream Invert Elevation	9.59 feet NAVD88
Downstream Invert Elevation	9.07 feet NAVD88
Bottom Roughness Value	0.015
Sidewall Roughness Value	0.015

Notes:
H by W = height by width; NAVD88 = North American Vertical Datum of 1988

The proposed railroad bridges for each of the alternatives were modeled using upstream and downstream cross-sections to represent the proposed geometry for each alternative. Bridge piers were modeled as having a square nose and tail pier shape coefficient using Yarnell's energy equation method.[5] Abutment slopes were assumed to be 2H:1V for all alternatives. Table 3 provides the geometry of the bridge used in the model for each of the three alternatives.

Table 3
Railroad Bridge Opening Input Summary

Proposed Condition[a]	High Flow Channel Width (feet)	No. of Piers	Elevation of Pedestrian Walkway Under Bridge (feet NAVD88)
Alternative 1	50[b]	2	10.4
Alternative 2	60	2	n/a (Separated Access)
Alternative 3	100[b]	3	11.1

Notes:
a. See Attachment 1 for proposed alternative figures.
b. An additional 10 feet of high flow channel width is assumed, to include the flooded pedestrian walkway.
NAVD88 = North American Vertical Datum of 1988

The proposed conditions model geometries also included excavation of the floodplain between the pedestrian and railroad bridges for areas shown as wetland on the alternatives.

[5] A constant value of 1.25 for Yarnell Pier coefficient was used for all alternatives.

Floodplain excavation depth at a channel cross-section was set to the minimum depth required to inundate the proposed wetland at a 2-year event.

Model Boundary Conditions

The upstream model boundary condition was set as a steady state inflow rate (see Table 1) with the normal depth condition based on the LiDAR-generated channel bed slope (2.5%). The downstream boundary conditions were set to MHHW (9.0 feet NAVD88) or annual maximum tide (10.5 feet NAVD88).[6] Mid-range sea level rise estimates for 2030 (7 centimeters), 2050 (17 centimeters), and 2100 (62 centimeters) were also considered in the analysis and were applied to the downstream boundary conditions for the various simulations to evaluate the sustainability of the proposed pedestrian walkway underneath the railroad bridge. Sea level rise estimates were taken from the National Research Council (NRC) Report published in 2012 that documents sea level rise estimates for the west coast of the United States. Table 4 shows the potential tidal elevations in the future based on these sea level rise estimates.

Table 4
Predicted Tide Elevations with Sea-level Rise

Year	MHHW (feet NAVD88)	Annual Maximum Tide (feet NAVD88)
2030	9.2	10.7
2050	9.6	11.1
2100	11.0	12.5

Notes:
MHHW = mean higher high water; NAVD88 = North American Vertical Datum of 1988

Predicted Water Surface Elevations

The model was used to develop predictions of water surface elevations within and upstream of the exiting culvert/tunnel and proposed openings. The water surface elevations were compared to the existing or proposed pedestrian walkway elevations to determine at what point the walkway could become inundated. Table 5 shows model predictions of freeboard for the pedestrian walkway based on the range of flows and water surface elevations

[6] Tidal datum information is provided in the Coastal Analysis Study for this project. These evaluations will be combined in the Final Feasibility Report for the project.

modeled. Freeboard is the vertical distance between the predicted water surface elevation and the elevation of the pedestrian walkway. A positive value of freeboard implies the walkway is above the predicted water surface elevation, and a negative value of freeboard implies the walkway is submerged.

Table 5
Freeboard of Pedestrian Walkway for High Flows and Tidal Elevations

Year	Pedestrian Walkway Freeboard (feet)					
	Existing Conditions (Walkway Elevation 10.5 feet NAVD88)		Alternative 1 (Walkway Elevation 10.4 feet NAVD88)		Alternative 3 (Walkway Elevation 11.1 feet NAVD88)	
	MHHW	Annual Maximum Tide	MHHW	Annual Maximum Tide	MHHW	Annual Maximum Tide
2015 (Current)	-1.4	-1.4	1.1	-0.1	1.9	0.5
2030	-1.4	-1.4	1.0	-0.4	1.7	0.3
2050	-1.4	-1.4	0.7	-0.7	1.4	Negligible
2100	-1.4	-1.8	-0.7	-1.6	Negligible	-1.0

Notes:
Alternative 2 was not evaluated because the pedestrian walkway will be isolated from Lund's Gulch Creek.
Freeboard values are from 135 cfs (100-year discharge) simulations.
MHHW = mean higher high water; NAVD88 = North American Vertical Datum of 1988

Model results suggest that the existing culvert's pedestrian walkway is currently inundated by over 1 foot during a 100-year discharge at MHHW and would continue to inundate as sea levels rise. This model result does not include impacts of sediment impoundment in the tunnel or upstream of the tunnel, which would increase the water surface elevations upstream of the tunnel and the flooding within the tunnel/culvert itself. Results show that Alternative 1 currently maintains freeboard during a 100-year event but is inundated slightly at annual maximum tide. By 2050, inundation during a 100-year event at the annual maximum tide would increase to approximately three quarters of a foot in depth. Alternative 3 maintains freeboard during a 100-year event at MHHW and the annual maximum tide for every scenario modeled through the year 2050. By the year 2100, all proposed alternatives will begin to become inundated by the tide alone (regardless of creek discharge) at MHHW and will be significantly inundated (a minimum of 1.0 foot) at annual maximum tide (regardless of creek discharge).

Predicted Sediment Transport Potential

To evaluate the sediment transport capacity of the proposed alternatives, average main channel shear stress outputs from HEC-RAS for each proposed alternative were compared to existing conditions. The primary locations of interest in this analysis are the entrances and outlets of existing or proposed structures.

Sediment transport capacity was evaluated for high flows (Table 1) occurring at MHHW (downstream boundary condition). Figures 5 through 8 provide predicted water surface elevations and bed shear stresses for high flows (Table 1) at MHHW elevation along the channel alignment for Existing Conditions, and Alternatives 1, 2, and 3, respectively. Results provided in Table 6 show the differences in model predictions of bed shear stress for the 2-year, 10-year, and 100-year discharge rates just upstream of the proposed new opening (railroad bridge). A negative value in Table 6 means that the bed shear stress (averaged across the channel) is less than existing conditions; a positive values means it is greater than existing conditions.

Table 6
Predicted Bed Shear Stress for Alternatives Compared with Existing Conditions at MHHW

Proposed Condition	**Difference in Shear Stress Upstream of Railroad Bridge**		
	57 cfs, 2-year flow (lb/ft^2)	**89 cfs, 10-year flow (lb/ft^2)**	**106 cfs, 25-year flow (lb/ft^2)**
Alternative 1	-0.4	+0.3	+1.1
Alternative 2	-0.5	+0.2	+0.9
Alternative 3	-0.7	Negligible	+0.8

Notes:
Model results are from 400 cfs discharge simulations.
cfs = cubic foot per second; lb/ft^2 = pound per square foot

At the 2-year flow, the average bed shear stress across the channel for all proposed alternatives will be lower than existing conditions. This is because the existing culvert/tunnel constricts the flow and increases velocities compared to the wider openings proposed in the alternatives. The wider opening will allow sediment from the creek to accrete within the new opening as the estuary expands upstream of the railroad berm once the constriction at the mouth of the creek is removed. At higher flows (10-year and

25-year), the cross-section averaged bed shear stress is increased compared to existing conditions. This indicates improved sediment transport capacity through this reach under proposed conditions; similar improvements are predicted for all alternatives within the precision of the evaluation. However, the results shown in Table 6 also indicate that the wider the opening, the lower the average channel sediment transport capacity. The lower average channel sediment transport capacity would more likely result in a dynamic channel through the opening because the sediment supply is more likely to periodically exceed the transport capacity.

It is important to note that the HEC-RAS models for proposed alternatives were developed assuming a uniform channel depth through the railroad bridge opening. In reality, a narrow, deeper, low-flow channel will develop within the channel migration zone of the proposed openings (see Section Views in Attachment A for illustration). Velocities in the low-flow channels are expected to increase sediment transport rates at lower flows through the bridge opening; however, the system will rely on periodic high flows to provide channel maintenance once the estuary environment has equilibrated to its sediment load.

FISH PASSAGE ASSESSMENT

The channel migration zone width for each alternative was compared to Washington Department of Fish and Wildlife (WDFW) guidance values for a stream simulation crossing (Barnard et al. 2013). Due to uncertainties in tidal cycles and estuary elevations at the outlet of Lund's Gulch, achieving a minimum stream simulation width will provide the greatest likelihood of conditions conducive to fish passage. Measurements taken from the site visit indicate a stable bankfull width to be approximately 20 feet. Comparisons shown in Table 7 indicate that, for all three alternatives, the crossings provide more than adequate width for stream simulation. For additional information on fish passage and fish use, see the Fish Habitat Benefits Analysis Study (Confluence 2015).

Table 7
Stream Simulation Conditions Summary

Proposed Condition	Railroad Bridge Channel Migration Width (feet)	Pedestrian Bridge Channel Migration Width (feet)	WDFW (2013) Manual Guidance Value (feet)
Alternative 1	40.0	40.0	≥ 26.0 (*1.2 x Bankfull width + 2 feet*)
Alternative 2	60.0	40.0	
Alternative 3	90.0	40.0	

Note: WDFW = Washington Department of Fish and Wildlife

REFERENCES

Barnard, R.J., J. Johnson, P. Brooks, K.M. Bates, B. Heiner, J.P. Klavas, D.C. Ponder, P.D. Smith, and P.D. Powers, 2013. *Water Crossings Design Guidelines*. Washington Department of Fish and Wildlife, Olympia, Washington.

Brunner, G.W., 2010a. *HEC-RAS River Analysis Systems User's Manual Version 4.1.* CDP-68. U.S. Army Corps of Engineers. Hydrologic Engineering Center. Davis, California.

Brunner, G.W., 2010b. *HEC-RAS River Analysis Systems Hydraulic Reference Manual.* CDP-69. U.S. Army Corps of Engineers. Hydrologic Engineering Center. Davis, California.

Confluence Environmental Company, 2015. *Fish Habitat Benefits Analysis to Support Restoration Feasibility Study at Meadowdale Beach Park*. Prepared for Snohomish County Parks and Recreation.

NOAA (National Oceanic and Atmospheric Administration), 2014. *Bench Mark Sheet for 9447130, Seattle WA.* National Oceanic and Atmospheric Administration. Silver Spring, Maryland.

NRC (National Research Council), 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. 2012.

Snohomish County, 1989. *Lunds Gulch Basin Study Draft Report*. Snohomish County Public Works, Surface Water Management. April 1989.

Snohomish County, 2002. *Puget Sound Tributaries Drainage Needs Report.* DNR No. 11. Snohomish County Public Works Department, Surface Water Management Division. December 2002. Available from: http://snohomishcountywa.gov/1079/Urban-Drainage

Te Chow, V., 1959. *Open channel hydraulics*. New York: McGraw-Hill.

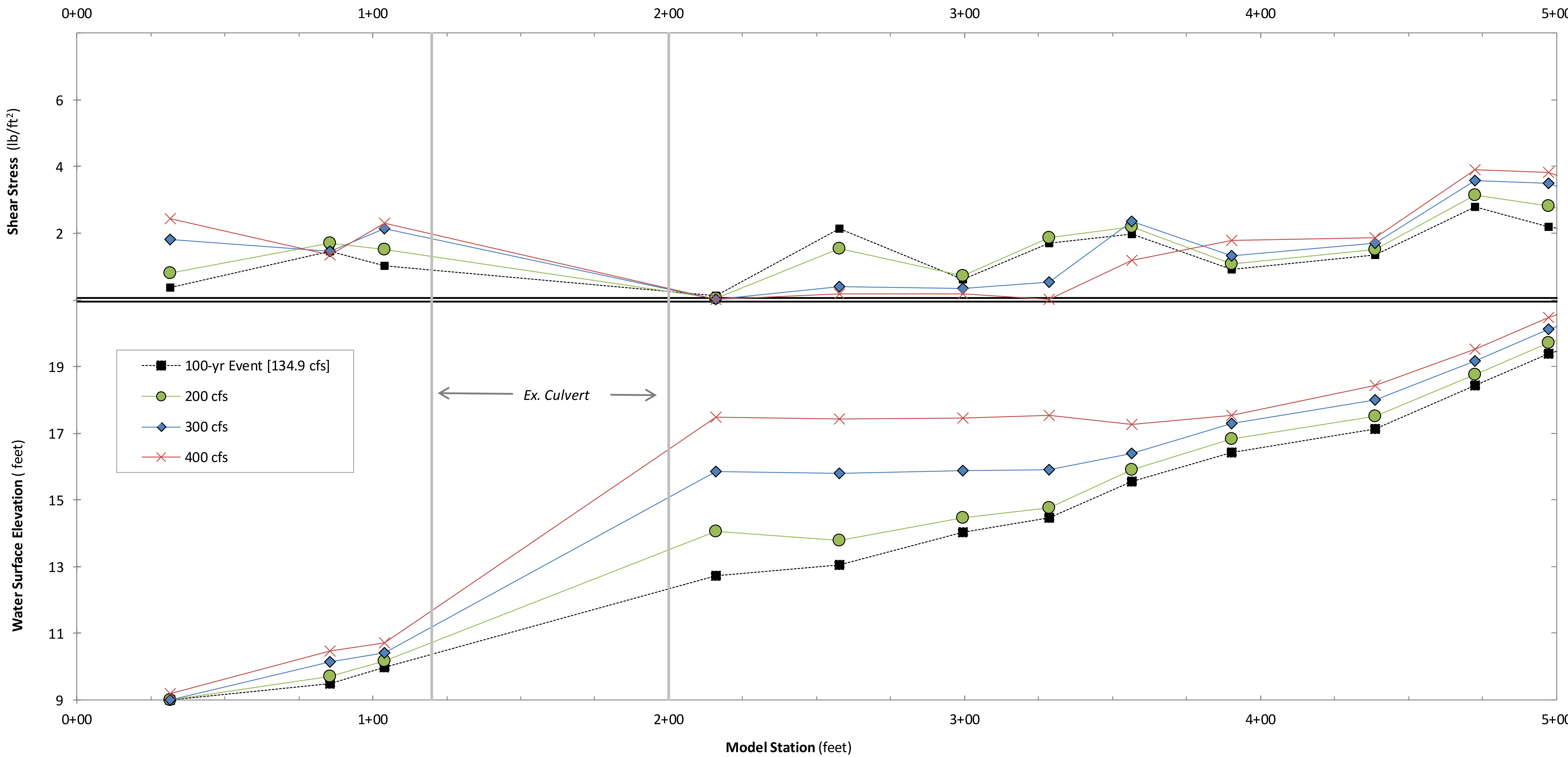
U.S. Global Change Research Program, 2009. *Global Climate Change Impacts in the United States*. Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA.

FIGURES

ANCHOR QEA

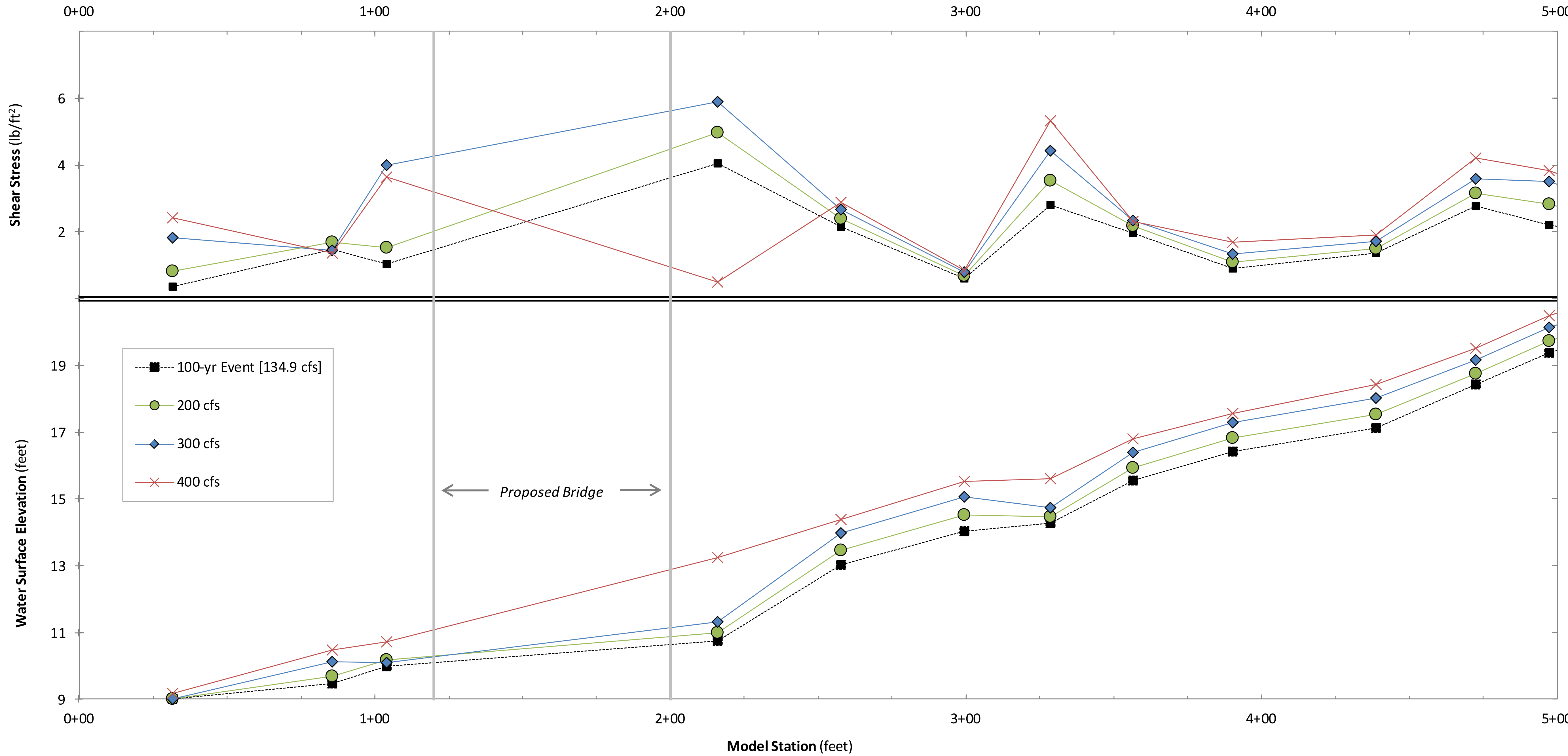
Snohomish County
Parks & Recreation Department and
Surface Water Mgt. Div./Public Works

Figure 1
HEC-RAS Model of Lower Lund's Gulch
Meadowdale Beach County Park Feasibility Study
Snohomish County, WA



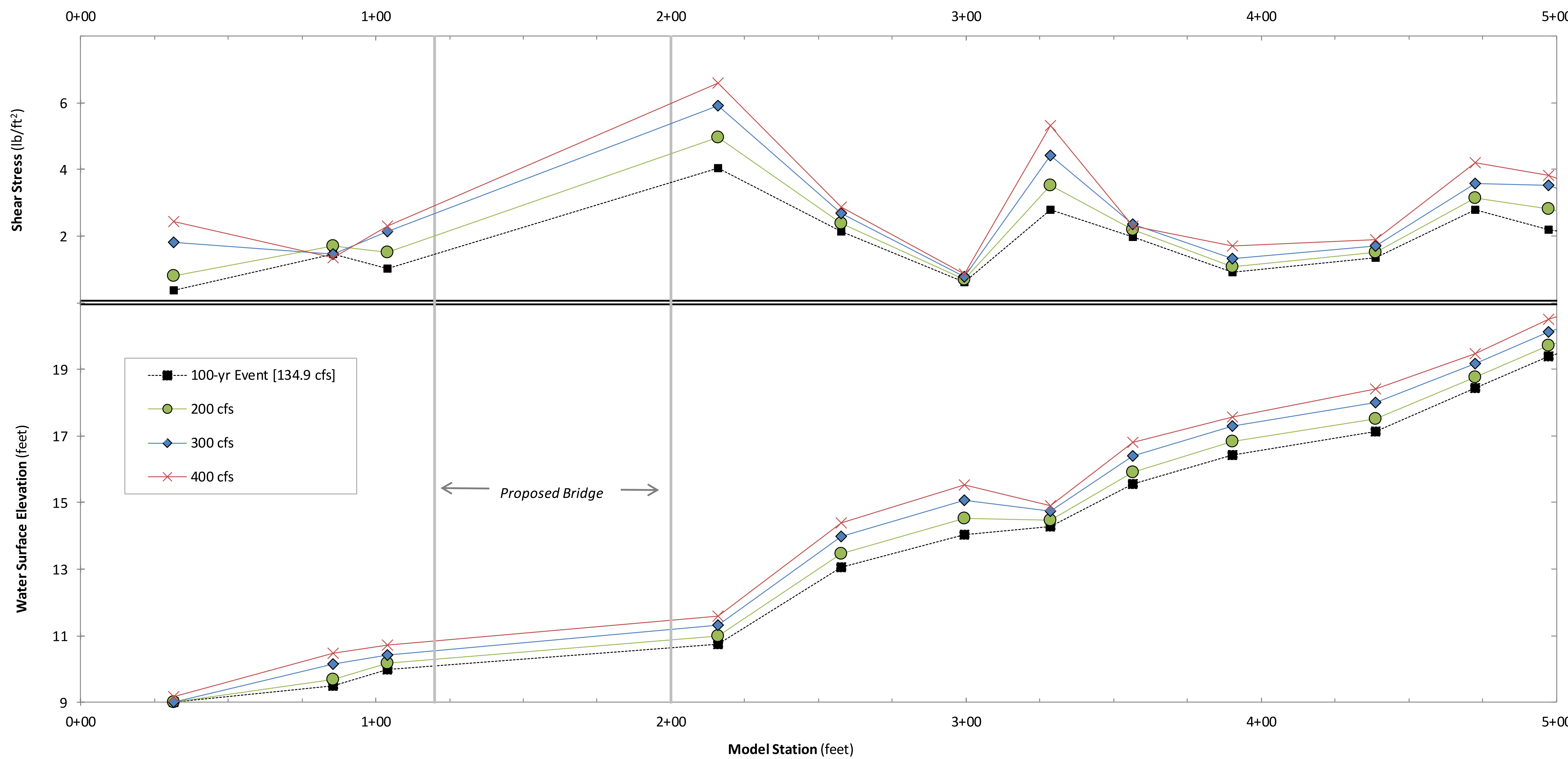
Notes: 1. Opening is modeled as a box culvert with flared wingwalls to approximate the RR bridge design.
2. Model topography generated from LiDAR data in the NAVD88 vertical datum.
3. In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.
4. 100-yr event discharge is from the County HSPF model of existing conditions.

Figure 2
Existing 6 ft. Opening
Hydrology and Hydraulics Evaluation
Meadowdale Beach County Park Feasibility Study



Notes:

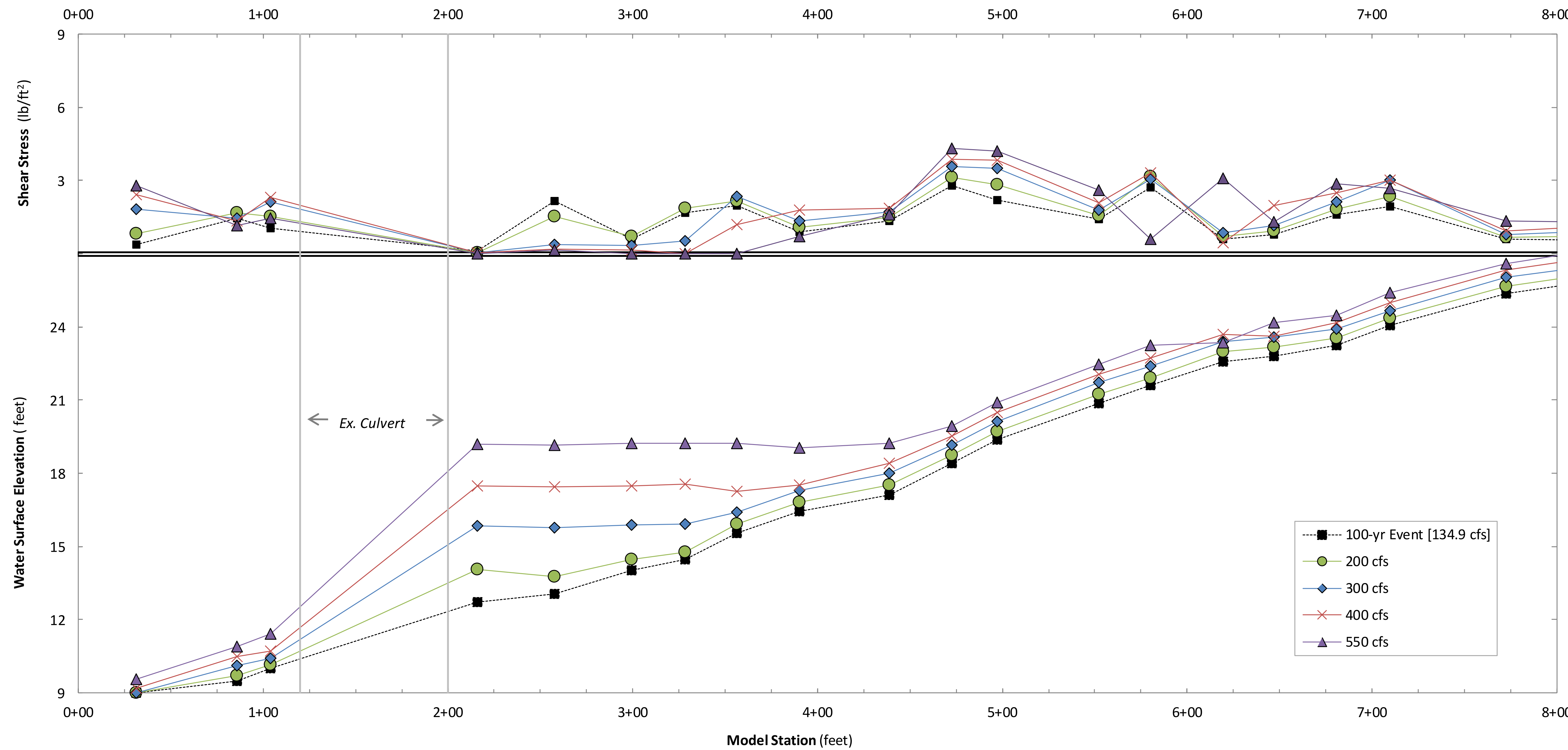
1. *Opening is modeled as a box culvert with flared wingwalls to approximate the RR bridge design.*
2. *Model topography generated from LiDAR data in the NAVD88 vertical datum.*
3. *In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.*
4. *100-yr event discharge is from the County HSPF model of existing conditions.*



Notes: 1. *Opening is modeled as a box culvert with flared wingwalls to approximate the RR bridge design.*
2. *Model topography generated from LiDAR data in the NAVD88 vertical datum.*
3. *In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.*
4. *100-yr event discharge is from the County HSPF model of existing conditions.*

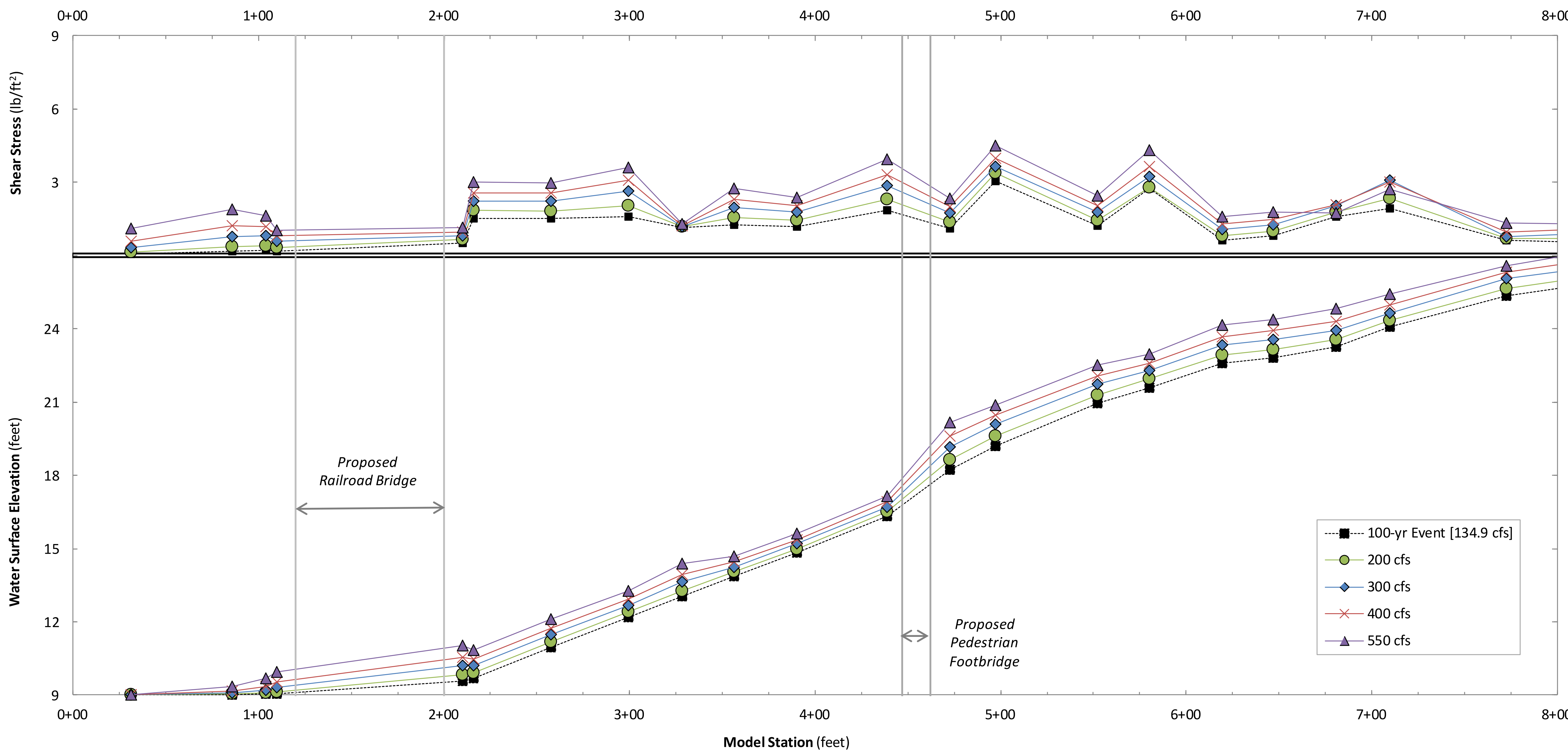
ANCHOR QEA

Figure 4
Proposed 30 ft. Opening
Hydrology and Hydraulics Evaluation
Meadowdale Beach County Park Feasibility Study



Notes:
1. *Opening is modeled as a box culvert with flared wingwalls to approximate the RR bridge design.*
2. *Model topography generated from LiDAR data in the NAVD88 vertical datum.*
3. *In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.*
4. *100-yr event discharge is from the County HSPF model of existing conditions.*

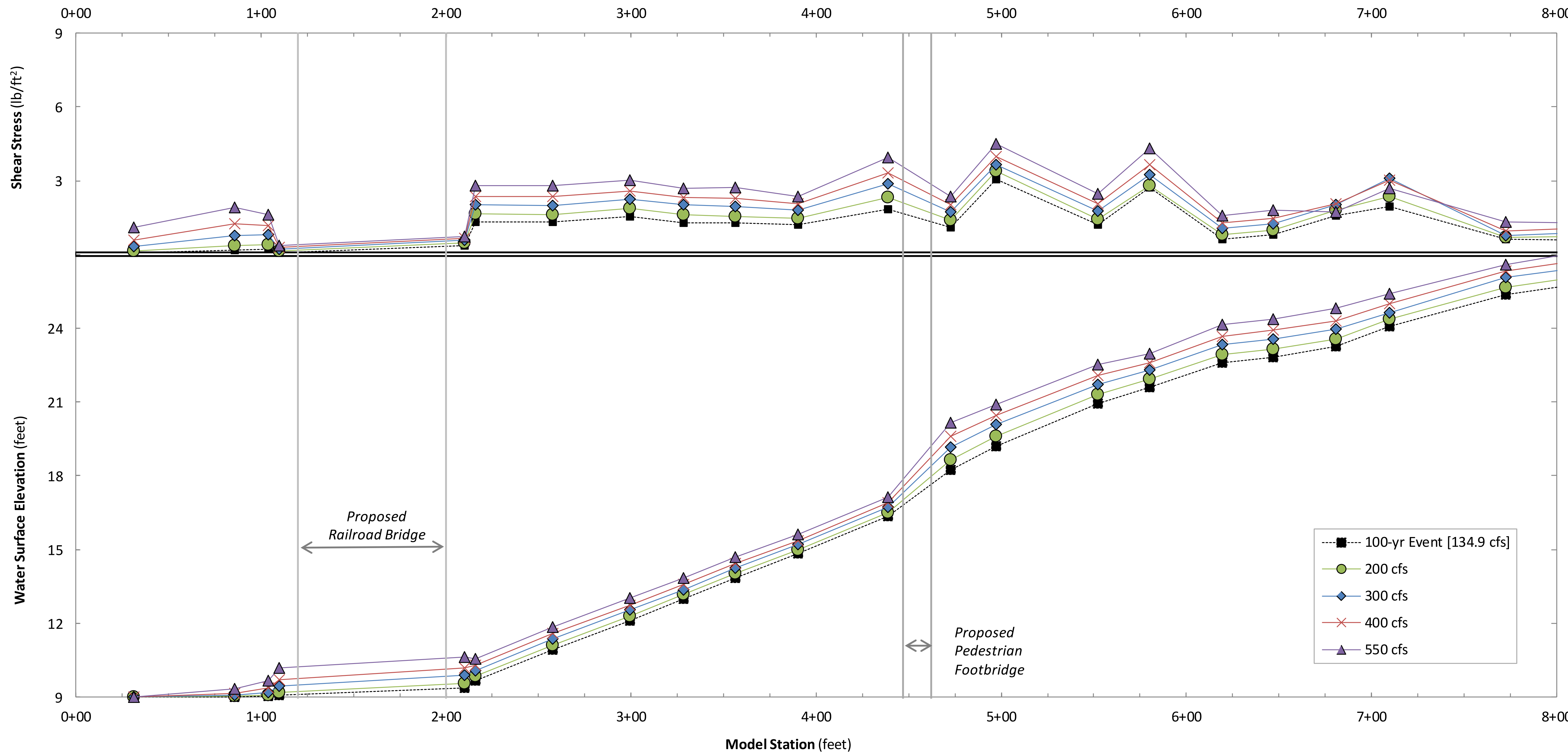
Figure 5
Existing Conditions – 6 ft. Box Culvert
Hydrology and Hydraulics Evaluation
Meadowdale Beach County Park Feasibility Study



Notes: 1. *Opening is modeled as a bridge with 2 piers to approximate the Alternative 1 RR bridge design.*
2. *Model topography generated from LiDAR data in the NAVD88 vertical datum.*
3. *In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.*
4. *100-yr event discharge is from the County HSPF model of existing conditions.*

ANCHOR QEA

Figure 6
Alternative 1 – 40 ft. Channel Migration Zone
Hydrology and Hydraulics Evaluation
Meadowdale Beach County Park Feasibility Study



Notes:
1. *Opening is modeled as a bridge with 2 piers to approximate the Alternative 2 RR bridge design.*
2. *Model topography generated from LiDAR data in the NAVD88 vertical datum.*
3. *In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.*
4. *100-yr event discharge is from the County HSPF model of existing conditions.*

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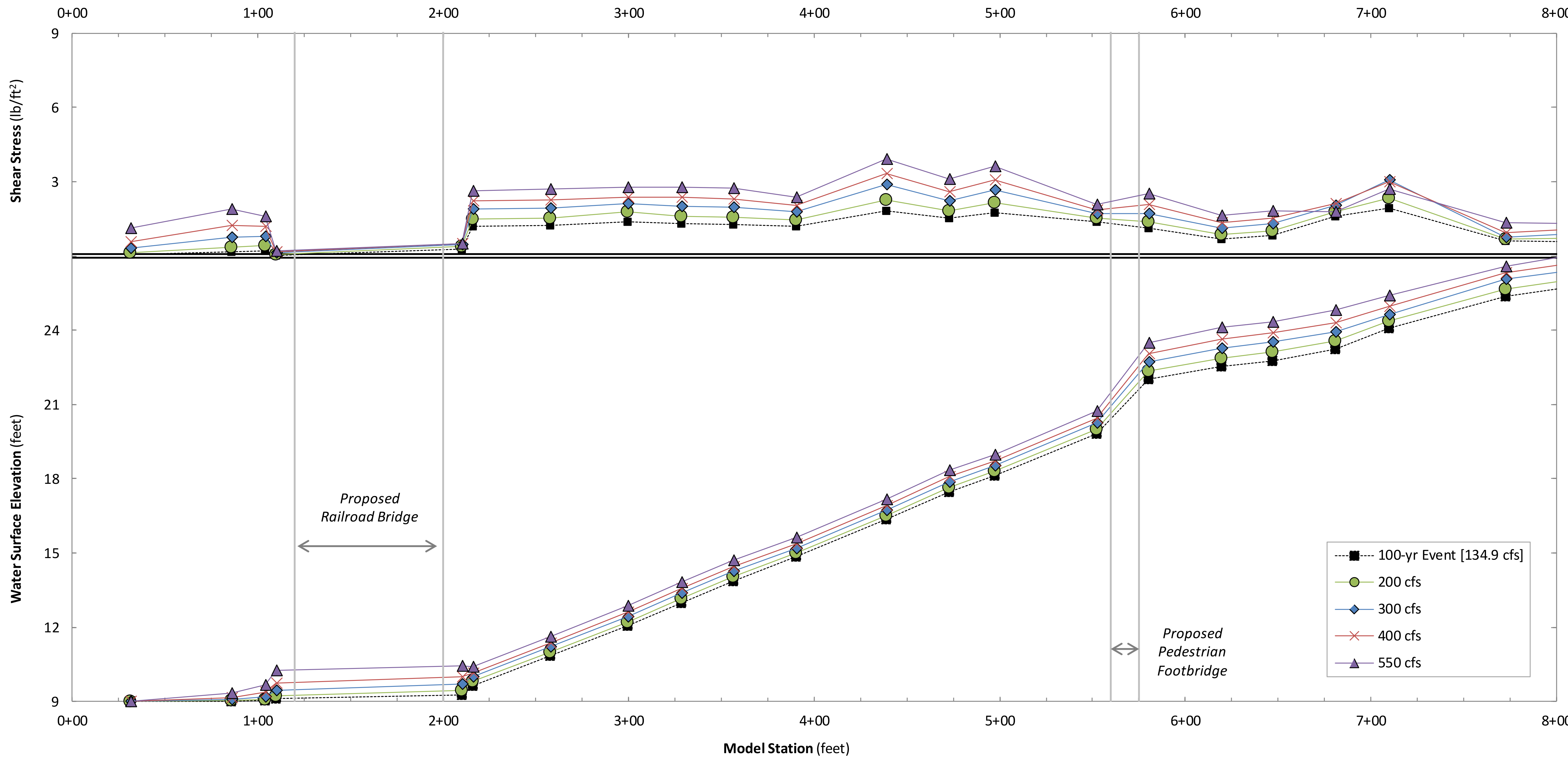
ANCHOR QEA

Figure 7
Alternative 2 – 60 ft. Channel Migration Zone
Hydrology and Hydraulics Evaluation
Meadowdale Beach County Park Feasibility Study



Notes:
1. Opening is modeled as a bridge with 3 piers to approximate the Alternative 3 RR bridge design.
2. Model topography generated from LiDAR data in the NAVD88 vertical datum.
3. In-channel Manning's n assumed to be 0.045 at stations 0+00 to 4+00 and 0.055 at stations 4+00 upstream.
4. 100-yr event discharge is from the County HSPF model of existing conditions.

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ANCHOR QEA

Figure 8
Alternative 3 – 90 ft. Channel Migration Zone
Hydrology and Hydraulics Evaluation
Meadowdale Beach County Park Feasibility Study

ATTACHMENT A
PLAN AND SECTION VIEWS OF PROPOSED ALTERNATIVES

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
Revised on 3/9/2015 based on County feedback.

Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
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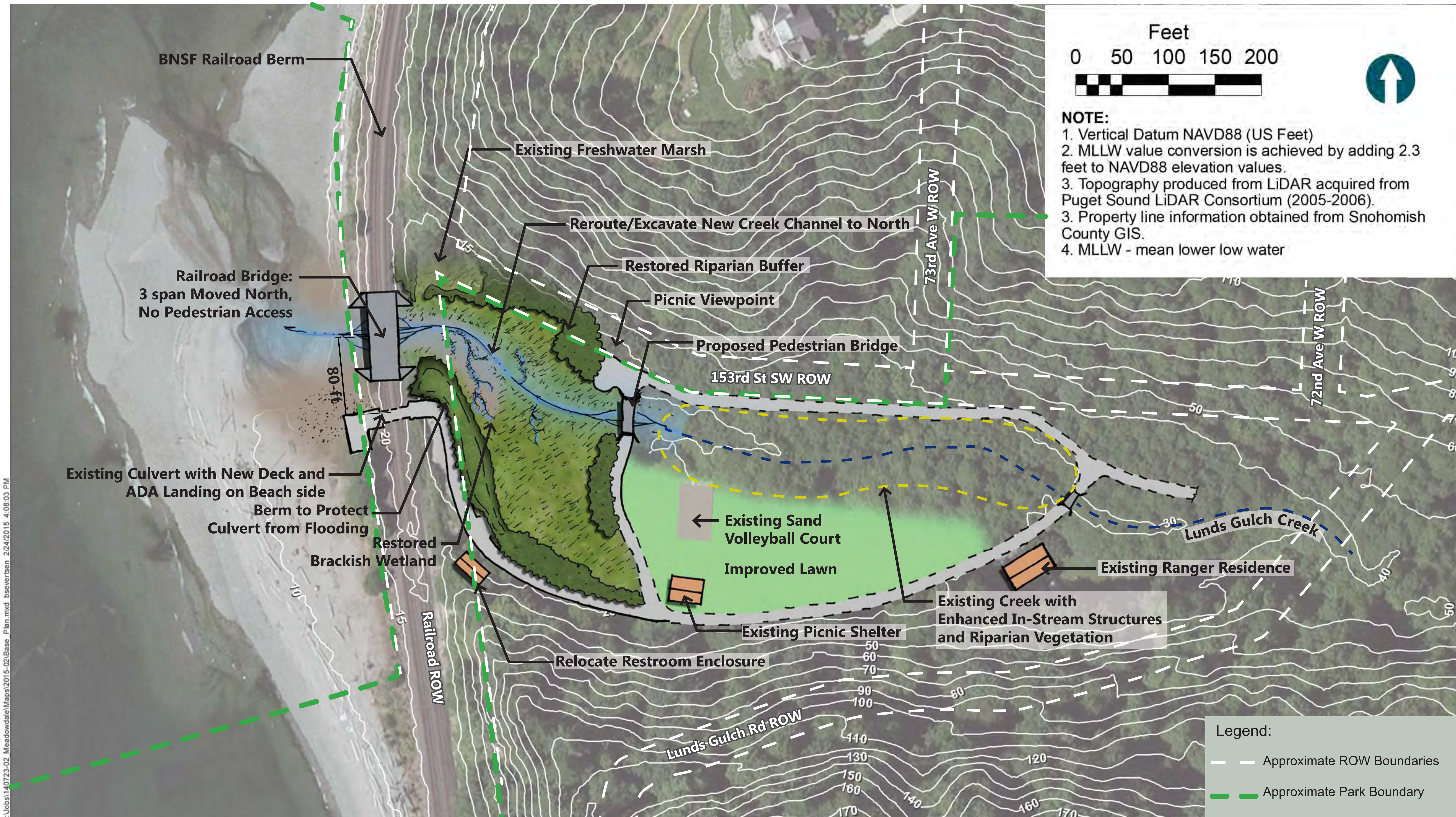

Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

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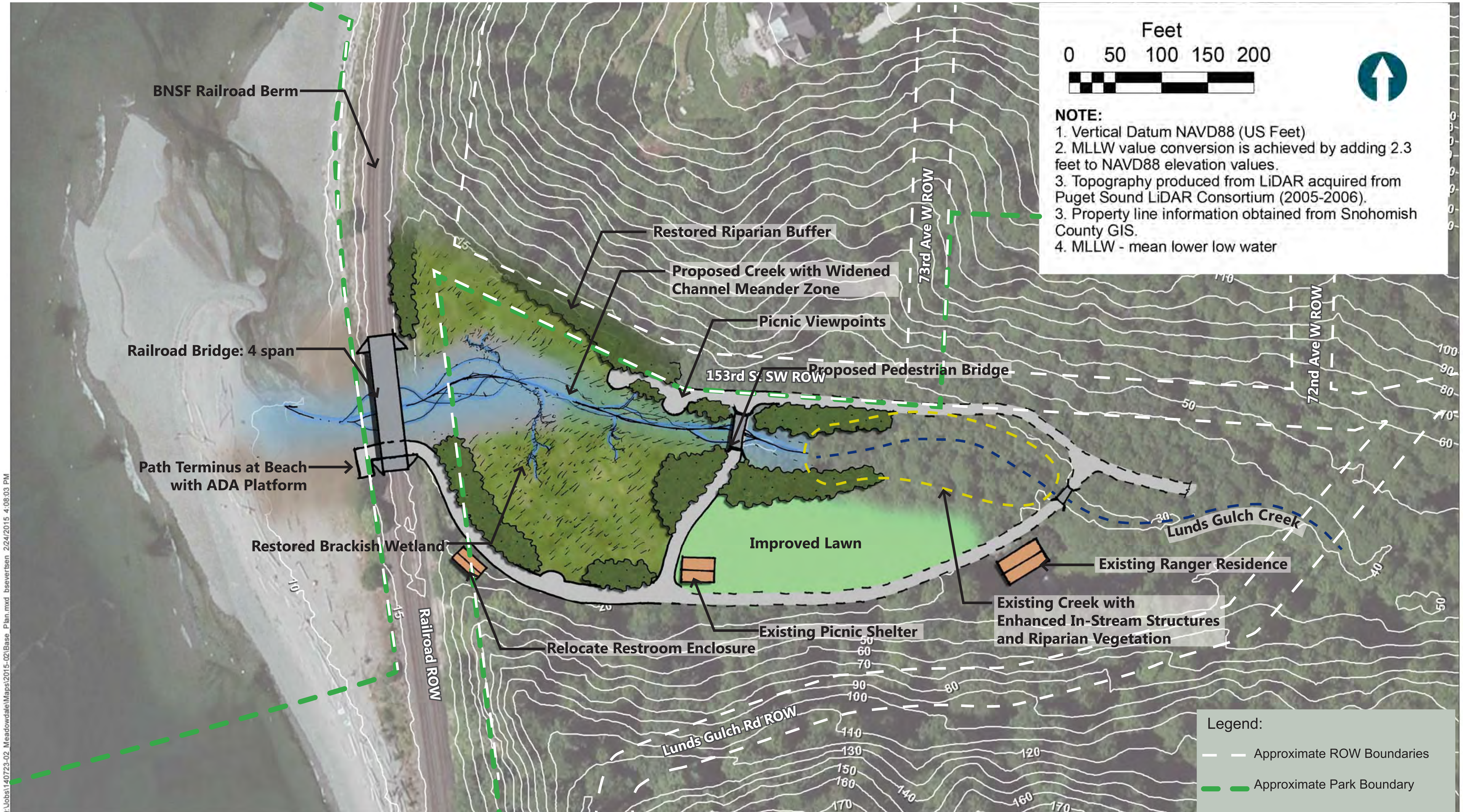
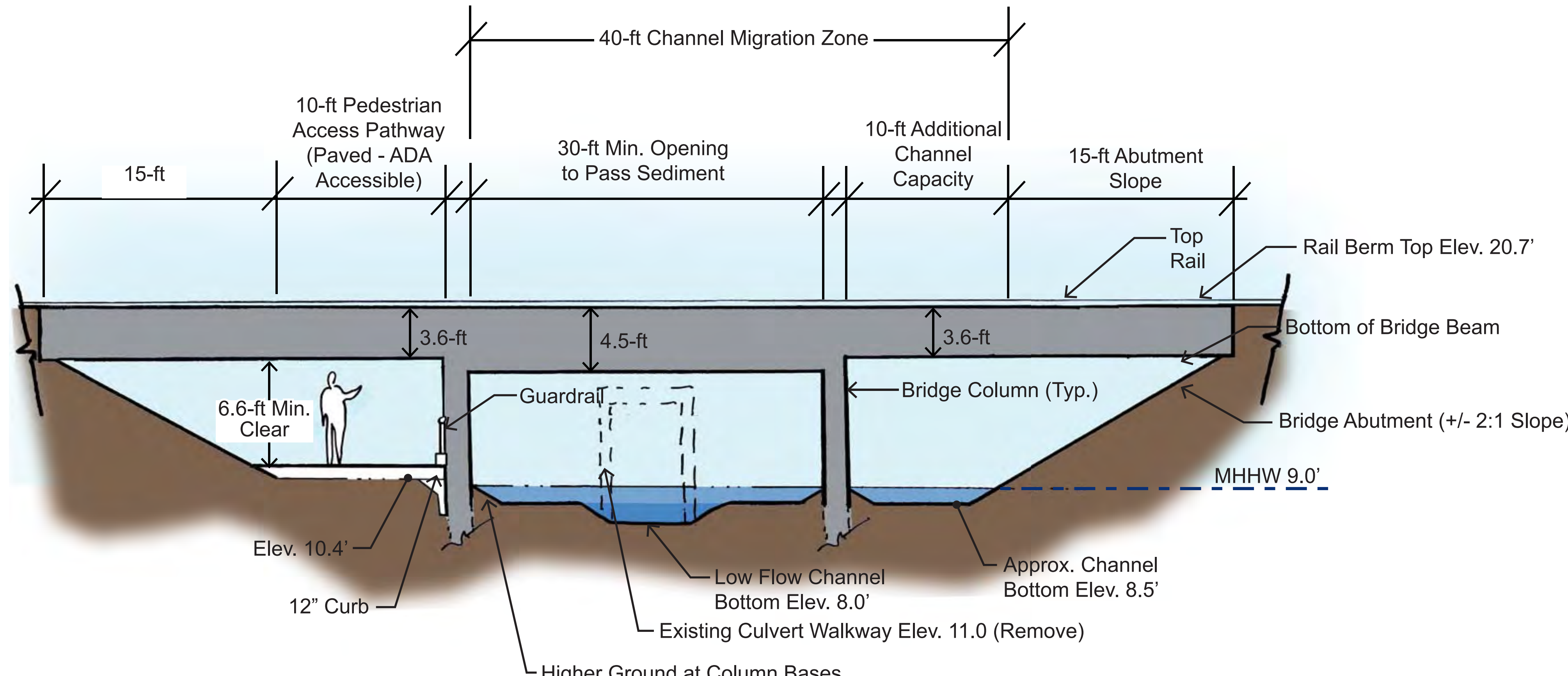


Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat

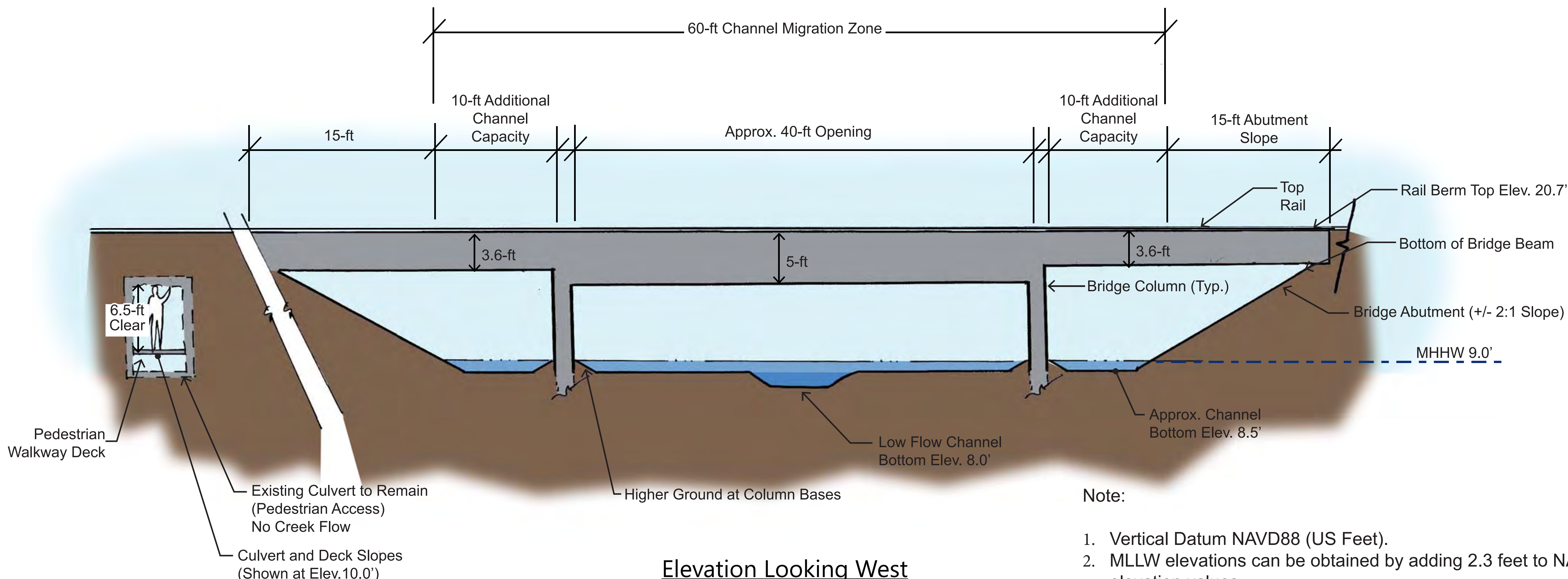


Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat



Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
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Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY
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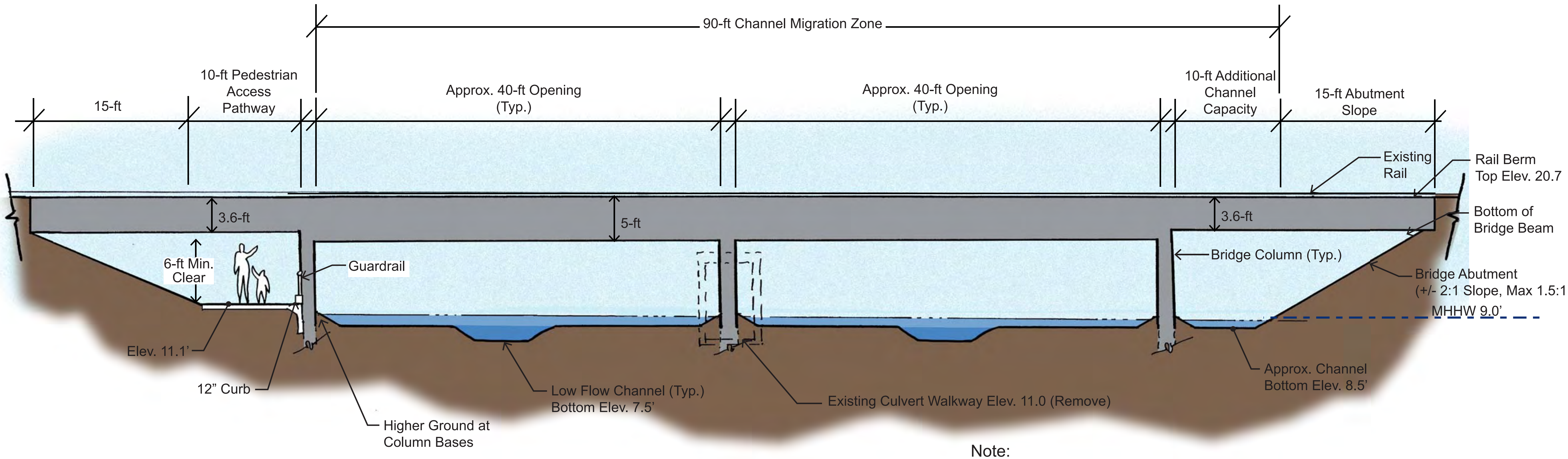

Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
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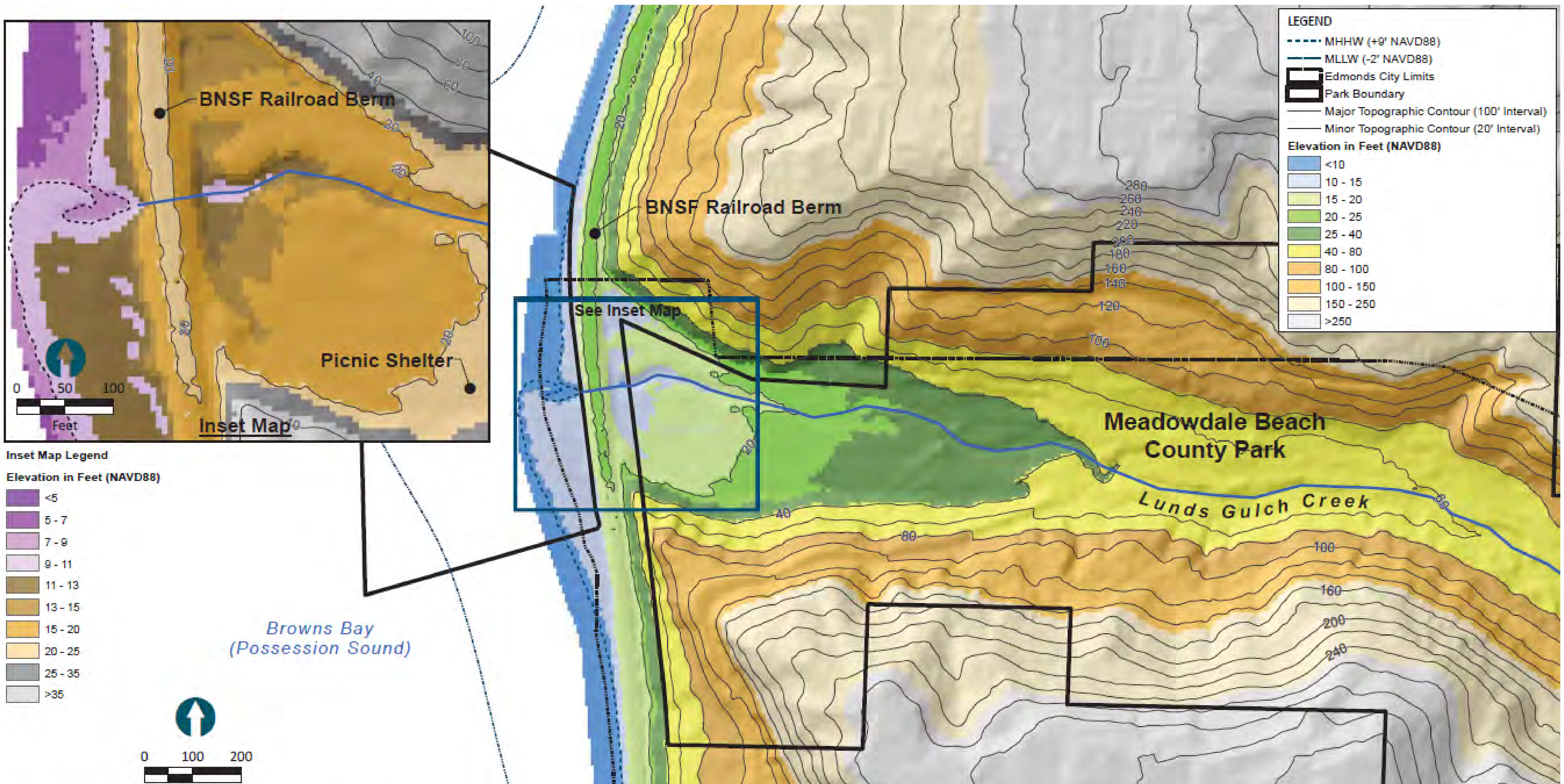
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat

ATTACHMENT B
SITE TOPOGRAPHY



NOTES:
1. Topography produced from LiDAR data acquired from Puget Sound Lidar Consortium (2005-2006).
2. Vertical datum is North American Vertical Datum of 1988 (NAVD88).
3. Contour interval is 20'.
4. Tidal datums acquired from NOAA VDatum tool (v.3.2), Puget Sound.

Site Topography (LiDAR)
Meadowdale Beach County Park Feasiblity Study
Snohomish County, WA

APPENDIX C GEOTECHNICAL/GEOLOGIC ASSESSMENT/SEDIMENT LOADING EVALUATION MEMORANDUM

Meadowdale Beach Park
Geotechnical Feasibility Study
Geologic Assessment, and Sediment Loading
South Snohomish County, Washington

September 15, 2015

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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Submitted To:
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Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, WA 98101

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
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ALASKA
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WISCONSIN

September 15, 2015

Ms. Kathy Ketteridge
Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, WA 98101

RE: MEADOWDALE BEACH PARK GEOTECHNICAL FEASIBILITY STUDY, GEOLOGIC ASSESSMENT, AND SEDIMENT LOADING, SOUTH SNOHOMISH COUNTY, WASHINGTON

Dear Ms. Ketteridge:

This letter report presents our feasibility study for geotechnical engineering, geologic assessment, and sediment loading estimates to Lund's Gulch for the Meadowdale Beach Park (Park) Feasibility Study. The Park is in Lund's Gulch, which is a roughly 1½-mile-long drainage oriented west-northwest from uplands to Puget Sound (Figure 1). Sediment builds up near the mouth of Lund's Gulch, at a culvert beneath the BNSF Railway Company (BNSF) railroad crossing, on an annual basis. This sediment, accumulating on the upstream side of the culvert, is problematic for the railroad, Park officials, and Park users. The purpose of this study is to provide geotechnical engineering and geologic input to the design team for the evaluation and selection of a preferred alternative to mitigate the sediment buildup in the culvert. This input does not constitute design recommendations and should only be used for feasibility evaluations.

GEOLOGY

Geologic Setting

There is a general consensus in the published geologic literature that the Puget Sound area was subjected to six or more major glacial events. Each glaciation deposited new sediment and partially eroded previous sediments. During the intervening periods when glacial ice was not present, normal stream processes, wave action, weathering, and landsliding eroded and reworked some of the glacially derived sediment, further complicating the geologic setting.

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During the most recent Vashon Stade of the Fraser Glaciation that covered the central Puget Lowland approximately 18,000 to 16,000 years before present (Porter and Swanson, 1998), the glacial ice is estimated to have been about 3,000 feet thick in the project area (Thorson, 1989). The weight of the glacial ice resulted in compaction of glacial and nonglacial soils beneath the ice. The glacial and nonglacial deposits are overlain by younger (Holocene Epoch), relatively loose and soft, post-glacial soils that include peat, beach, colluvial, and fill deposits.

Lund's Gulch was initially carved by glacial meltwater after ice from the most recent, Fraser, glaciation retreated and the land was uncovered (Applied Geotechnology Inc. 1986). During the time of the ice retreat, the steep slopes along the sides of the meltwater channel became destabilized and slid or slumped and remain largely stable in their position (Applied Geotechnology Inc., 1986). Several of these glacial meltwater channels and slump block benches can be seen with terrain or Light Detection and Ranging (LiDAR) mapping in the central Puget Sound region, as seen in Figure 1 along Norma Beach Road and Picnic Point Road north of the project area.

Lund's Gulch incises through glacial and non-glacial soils from uplands of greater than 300 feet elevation as it flows out to Puget Sound along a west-northwest trend in south Snohomish County (Figure 1). The Park encompasses the lower half of Lund's Gulch. The upper mile of Lund's Gulch (from 56th Avenue West) is deeply incised with several smaller gullies, drainages, and seeps flowing into the creek channel. A tributary from the north joins Lund's Gulch within the Park. The lower half-mile of Lund's Gulch is a broader valley bottom with steep side slopes.

At its terminus, Lund's creek outlets to Puget Sound through an approximately 6-foot-wide by 9-foot-high, 55-foot-long culvert passing through the BNSF railroad embankment. After passing beneath the railway, the creek forms a delta on the west side of the railroad embankment. In general, the creek flows north through the delta as influenced by northward littoral drift of the Puget Sound.

Existing Geologic Information

According to geologic maps of the area (Washington State Department of Natural Resources, 2011; Minard, 1983; and Smith 1975), we have interpreted the stratigraphy of Lund's Gulch to consist of the following geologic units:

- Quaternary Landslide Deposits, Qls/colluvium – Loose or soft, chaotically deposited soils.
- Quaternary Vashon Recessional Outwash, Qvro – Medium dense, glacial fluvial during recession or ablation of the last ice sheet.
- Quaternary Vashon Till, Qvt – Very dense diamicts.
- Quaternary Vashon Advanced Outwash / Quaternary Vashon Esperance Sand, Qva/Qe – Very dense, glacial fluvial, advance outwash.
- Quaternary Whidbey Formation / Quaternary Pre-Vashon Fluvial Deposits, Qw/Qpnf – Very dense, non-glacial, fluvial, generally poorly graded fine to medium sand with fine gravel interbedded with silt and clay.
- Quaternary Double Bluff Drift / Quaternary Pre-Vashon Glacial Till, Qdb/Qpgt – Very dense, stratified glacial sediments, consisting of till, outwash, and glaciolacustrine deposits.

GEOLOGIC ASSESSMENT AND SEDIMENT LOADING EVALUATION

The purpose of this evaluation is to assess known landslide hazards and bank erosion within Lund’s Gulch contributing to sediment deposition upstream and within the culvert passing through the BNSF railroad embankment. For this evaluation, Shannon & Wilson, Inc. (Shannon & Wilson): (1) reviewed existing geologic data, (2) talked with Park Ranger Doug Dailer about Park history pertaining to the sediment buildup, (3) performed an on-site geologic reconnaissance of Lund’s Gulch to investigate sediment sources, and (4) estimated sediment loading in this creek channel. We understand that these evaluations will be used by Anchor QEA, LLC in their evaluations of the flow and sedimentation characteristics of Lund’s creek.

Geologic Reconnaissance

Shannon & Wilson geologists performed a site reconnaissance in December 2014. Topographic field maps with 10-foot contours and hillshade images generated from LiDAR (2005) were assessed prior to the field visit to look for landscape-scale features that were potential sources of sediment to the creek. Landscape-scale features from the field maps included areas with bowl and arcuate shapes or headscarps, slumped and hummocky landscapes, and debris fans and colluvium mounds.

On December 4, 2014, geologists met with resident Park Ranger Doug Dailer, who has lived on site since 1992. This visit was followed by a two-day field reconnaissance walking the length of

Lund's Gulch, and identifying, characterizing, and quantifying sediment sources and delivery mechanisms. In the field, geologists walked the length of Lund's Gulch from the mouth near the coastline of the Puget Sound to the upper reaches just east of where 56th Avenue West would intersect with Lund's Gulch (Figure 1). At this projected intersection: (1) the creek valley becomes less incised with a broader bottom; (2) slopes are more gently inclined; (3) mature, straight conifers dominate the forested landscape; and (4) sediment input contributing to the sediment load of the creek is relatively low compared to the creek system as a whole.

Each location visited in the field was given an identification number (Location ID), plotted as points on field maps, recorded on a Global Positioning System, and photographed. Notes were recorded for each location and included the following:

- Sediment Delivery Source – Visual assessment of whether or not sediment appeared to be delivered to Lund's creek.
- Sediment Delivery Mechanism – Categorization of event-driven or incremental input and sediment delivery type.
- Estimated dimensions and/or volumes of sediment delivery and rate (if incremental).

The Site and Exploration Plan (Figure 2) shows all of the locations visited at the site. Table 1 lists notes recorded for only the locations that appeared to be contributing sediment to Lund's creek. Further explanation of location notes are provided in subsequent sections below. Photographs of select locations are shown in Figures 3 through 5.

Sediment Loading Evaluation

Sediment loading in a creek system takes into account the sediment delivery and the sediment storage. This study evaluates the locations and characteristics of sediment sources and processes that contribute sediment to the creek but does not evaluate the sediment transport within the creek.

The topography and stratigraphy of Lund's Gulch cause it to be prone to sediment input into the creek and out to the delta. Steep-sided banks in the upper two-thirds of Lund's Gulch provide opportunity for entrainment of sediment by creep movement of landslide deposits from the valley walls and by high-water/high-flow erosion of the exposed creek banks. Additionally, discrete landslides of various sizes directly deliver masses of sediment and debris periodically.

Sediment Delivery Source

Some locations explored during the field reconnaissance did not appear to have contributed sediment to Lund's creek. Once on-site, some of the landscape-scale features identified during the desk study appeared to not be active. For other locations, it appeared that a landslide had occurred but the debris runout had not reached as far as the creek and contributed to the creek's sediment load. Some parts of these older landslide deposits could re-mobilize and eventually reach the creek, but have not been taken into account in this study.

Sediment source activity (or relative activity) is also an important area of note. Our approximate record of sediment sources and contribution includes a 17-year history of known landslides dating back to 1996, vegetation characteristics of slowly moving colluvial slopes, and bare earth or scarps in proximity to the creek.

Sediment Delivery Mechanisms

Episodic Events – ten-year (estimated), event-driven landslides that can be deep-seated or shallow-rapid surficial slides, causing immediate sediment delivery to the creek, which can potentially temporarily block creek flow. This type of sediment delivery were associated with locations based on recent major winter storm events (the winters of 1996/97 and 2007/08) and a recent event that had occurred within a month of the field reconnaissance in November 2014. The most recent event had impacted the Park and required drainage work and trail maintenance similarly to events that had occurred in the winters of 1996/97 and 2007/08 according to Park Ranger Doug Dailer (Pers. Comm., 2014). The characteristics of these known landslide locations, such as morphology and vegetation growth, were used as a proxy for other locations upstream with similar observed characteristics.

Incremental Slope Creep – slow movement of colluvial slopes toward the creek under the force of gravity. Studies by Saunders and Young (1983) empirically estimated annual volume of rock and sediment movement downslope by land sliding activity in similar geologic settings. Their studies assessed landslide scars to estimate their age, their approximate return interval, and their size. The empirically derived high and low estimates of colluvium entrained from downslope movement were 0.5 and 0.1 inch per year, respectively. By applying these rates of slope movement, our experience assessing slope instability, and inclinometer readings, we estimated rates of slope movement for those slopes exhibiting incremental slope creep in the project area. The estimated rates ranged from 1 inch per year (relatively fast movement), ½ inch per year, 0.3 inch per year (average movement), ¼ inch per year, to 0.1 inch per year (relatively slow movement).

Sediment Delivery Types

Several different sediment delivery types were recognized in the field and noted for each location. Often these types of delivery mechanism overlapped or were combined, but the end result is the same – sediment was delivered to the creek. The categories are listed below:

- Bank Erosion – high water conditions which cause episodic and/or incremental entrainment of the exposed soil.
- Toe of Slumps – colluvium collected in piles or mounds from previously slumped earth move slowly toward the creek or evacuate in one event to become entrained in the creek.
- Debris Slides and Debris Avalanches – these slides often include swaths of earth and trees as the soil mantle on steep slopes is mobilized downslope. These slides are often caused by saturation from heavy rains. In Lund's Gulch, thick colluvium over low permeable glacial till or glaciolacustrine deposits are prone to this type of landsliding. This mechanism is often associated with event-driven sediment delivery.
- Debris Flow and Shallow Rapid Slides – typically the top few inches of soil are mobilized as the ground becomes saturated and the slide behaves more like a viscous fluid as it moves downslope. This mechanism is often associated with event-driven sediment delivery.

Estimated Dimensions and Annual Sediment Input

Dimensions of sediment sources were estimated to quantify sediment delivery to the creek. For event-driven sediment delivery, the dimensions of the sediment source mass were estimated from scarps and/or debris mounds. The estimated volume at these sites were summed and divided by the 17-year evaluation period to provide an annual input. For incremental sediment delivery, the length and height dimensions were estimated and calculated with the estimated rates for annual volume input. For total estimated sediment input to Lund's Gulch, the event-driven and incremental calculations for annual volume were summed for a total annual input estimated in this study is 82 CY. The results of these calculations are shown in Table 1.

The results presented in Table 1 indicate that most of the sediment delivery to the Lund's Gulch creek is derived from discrete events during major winter storms. About seven times more sediment is delivered to the creek by discrete landslide events (approximately 72 cubic yards [CY]) than by incremental creek side erosion (approximately 10 CY) on an average annual basis. Furthermore, the 21 mapped discrete events that likely occurred during three significant storms in the 17-year study period are estimated to have delivered an average of about 400 CY for each storm. The largest single event observed was about 267 CY at location 12A.

Given the widespread instability of the slopes in Lund's Gulch and the quantities of colluvium on the margins of the creek, it is unlikely that the rate of sediment delivery will decrease during a typical design life of 50 to 100 years. It should be noted that the estimated sediment load is based on a 17-year evaluation period. Actual experienced sediment loads and may be periodically higher or lower than observed.

GEOTECHNICAL ENGINEERING FEASIBILITY

Snohomish County has selected three preferred bridge/culvert design alternatives. From a geotechnical engineering perspective, each of these alternatives would likely require the same major components. In general, the potential alternatives will require:

- A railroad bridge that will allow the creek to pass beneath the railroad.
- Sloped embankments where the existing BNSF embankment meets the proposed bridge.
- A pedestrian bridge crossing the creek.

BNSF Railway Company (BNSF) Bridge Deep Foundations

Based on our experience in the Puget Sound, we anticipate that the subsurface conditions will consist of loose and soft soil overlying dense and stiff, glacially overconsolidated soil. The depth to the dense and stiff, glacially overconsolidated soil is variable in the Puget Sound and borings will be required during design to determine foundation depths.

The loose and soft soil are often susceptible to liquefaction, lateral spreading, and bearing capacity failure during the longer return period design earthquake ground motions and thus will not likely be suitable for support of the bridge on shallow foundations. Therefore, support of the railroad bridge by deep foundations should be expected. We anticipate that BNSF will perform the construction of the railroad bridge. Based on our experience with typical railroad construction practices, the preferred deep foundations will be steel H-sections.

The extent of loose and soft soil and the axial and lateral deep foundation resistance that the site soil profile could provide is unknown and requires borings at the site. However, for the purposes of this feasibility evaluation, we have assumed subsurface conditions based on our experience in the Puget Sound. We have assumed that the loose and soft soil is 50 feet thick and is underlain by glacially consolidated soil that deep foundations are typically founded in throughout the region. For these assumed subsurface conditions, we estimate that the nominal resistance for steel H sections above would be approximately 150 to 200 kips, respectively, for pile embedment of about 100 to 150 feet. Detailed analysis beyond the potential foundation lengths would be performed during a subsequent project phase and is not being conducted for this feasibility study.

BNSF Railway Company (BNSF) Embankment Slopes

It is our understanding that the existing embankment slopes are performing in a satisfactory manner for BNSF operations. Geometries evaluated for this feasibility study do not exceed the existing embankment slope inclination or height.

Pedestrian Bridge Deep Foundations

According to discussions with the design team and review of existing documents, it is our understanding that the existing pedestrian bridge within the Park is supported on timber piling founded in medium dense to stiff soil below loose and soft soil. Similar foundations can be assumed for similar new pedestrian bridges. However, these foundations may require repair or replacement following events such as flooding, landslides, and/or earthquakes. Other pedestrian foundation alternatives would be considered during a subsequent project phase.

Design of Structures on or Near Existing High Slopes

Some additional alternatives evaluated included structures founded on the slopes adjacent to the BNSF railway and Lund's Gulch. These slopes are in an active state of land sliding and erosion and are prone to large failures. Alternatives that require structures on or near the slopes would require potentially extensive stabilization measures to be implemented. These measures would likely consist of soldier pile and tieback walls, tangent shafts, or soil nail and shotcrete systems. Given the height of the existing steep slopes of up to 250 feet and based on conversations with the design team, it is our opinion that stabilization of these slopes would be cost prohibitive.

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Potential Debris in the Existing BNSF Railway Company (BNSF) Embankment

Details of the BNSF railway embankment construction are not available. Based on our experience, embankments similar to these were possibly constructed as a wood trestle bridge. Subsequently, the void space between the structural members is filled forming an embankment. In addition, the fill of the embankment is undocumented and may consist of large objects such as riprap or large debris. If the existing embankment has a similar construction history or contains large objects, then the construction time of the railway bridge and project budget should be increased. The design team should evaluate the impact to construction schedule and budget for the two scenarios where embankment debris is or is not present. Based on this evaluation, further analysis, investigation, and/or consultation with BNSF may be desirable to reduce project uncertainty or evaluate other cost saving measures.

Remote investigation techniques such as ground penetrating radar (GPR) can provide additional information with regards to the possibility of large, subterranean objects. The interpretation of GPR results can be used to decide if more invasive exploration techniques would be appropriate and also guide the locations of those explorations. The exploration techniques would consist of horizontal drilling through the embankment or vertical borings from the top of track.

Geotechnical Services Required for Future Studies

Future studies ranging from conceptual to final design will require geotechnical engineering services. The required services include but are not limited to the following:

- Subsurface investigation program. There is no subsurface information around the BNSF embankment for the proposed railroad structure and little subsurface information for the pedestrian bridge. Subsurface information is required for geotechnical evaluations including deep foundation and embankment stability evaluations. For planning purposes, we recommend that a deep boring be performed at each abutment location and at a location midway between the abutments. The depths of the borings should extend at a minimum of 50 feet below the bottom of estimated deep foundation elements. The exploration depth may need to be modified depending on subsurface conditions encountered during the exploration phase. In addition, some exploration of the embankment is likely to be required. Similarly, shallow borings should be drilled near the pedestrian bridge.
- Lateral earth pressures evaluations for railroad abutments. Deep foundation design of the foundation elements including axial and lateral resistance evaluations.

- Liquefaction studies associated with the design ground motion levels for the loose and soft soil.
- Slope stability evaluations of the BNSF embankments and bridge abutments.

Additional geotechnical evaluations may be required depending on the preferred option and other design details and design criteria set in subsequent stages of development.

LIMITATIONS

The conclusions and evaluations in this letter report are based on a visual examination of the surface conditions as they existed during the time of our field reconnaissance and review of existing documents. No subsurface explorations were performed for this study. This work has been performed using practices consistent with geotechnical engineering and geologic industry standards in the region. Estimation of slope movement and sediment delivery with absolute certainty is not possible with currently available scientific knowledge. Geotechnical assessments made for this feasibility study are based on our experience in similar geologic conditions and are not sufficient for final design. If subsurface and environmental conditions described in this letter report change, we should be advised immediately so that we can review those conditions and reconsider our conclusions and evaluations.

Evaluations and input included in this letter report are presented to assist Anchor QEA, LLC and Snohomish County in assessing sediment transport in the creek system, delivery of that sediment to the culvert, and feasibility assessment of structures included in the proposed alternatives. Shannon & Wilson has included the enclosed, “Important Information About Your Geotechnical/ Environmental Report,” to assist you and others in understanding the use and limitations of our reports.

We appreciate the opportunity to be of service. If you have any questions or comments, please contact me.

Sincerely,

SHANNON & WILSON, INC.

State of Washington
Engineering Geologist
111
Licensed Geologist
William Thomas Laprade
9/15/15

Matthew D. Gibson, P.E.
Senior Principal Engineer
(Geotechnical Engineering Feasibility)

William T. Laprade, L.E.G.
Senior Vice President
(Geology, Geologic Assessment, and Sediment Loading Evaluation)

SAW:MDG:WTL/mdg

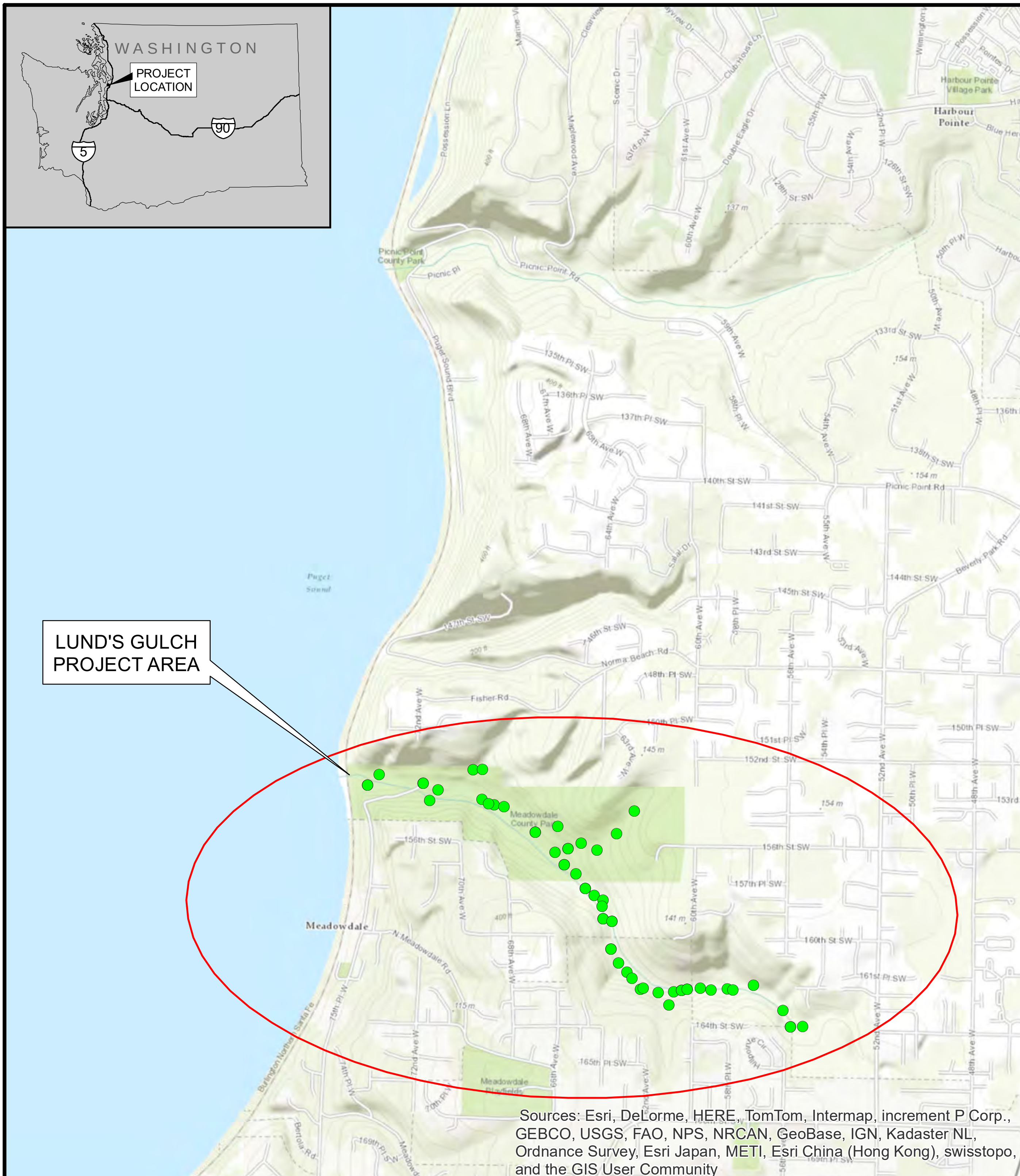
Enc: References
Table 1 – Meadowdale Beach Park Feasibility – Geotechnical Assessment and Sediment Loading
Figure 1 – Vicinity Map
Figure 2 – Site and Exploration Plan (3 sheets)
Figure 3 – Sediment accumulation downstream in Lund's Gulch. Photos from December 2014
field visit.
Figure 4 – Event driven sediment input to Lunch's Gulch. Photos from December 2014 field visit.
Figure 5 – Incremental sediment input to Lund's Gulch. Photos from December 2014 field visit.
Important Information About Your Geotechnical/Environmental Report

TABLE 1
MEADOWDALE BEACH PARK FEASIBILITY
GEOTECHNICAL ASSESSMENT AND SEDIMENT LOADING

Location ID	Sediment Input	Delivery Type	Dimensions Length (ft)	Width (ft)	Height (ft)	Rate (in/yr)	Discrete Event Volume (CY)	Bank Erosion Annual Input (ft^3)	Bank Erosion Annual Input (CY)
4A	Yes	Bank erosion	24	6	6	event	32.0		
4B	Yes	Bank erosion	24	--	6	0.1 in/yr		1.2	0.04
6	Yes	Toe of slumps/bank erosion	30	--	8	0.3 in/yr		6.0	0.22
7	Yes	Toe of slumps/bank erosion	40	20	2	event	59.3		
8	Yes	Bank erosion	75	6	4	event	66.7		
9	Yes	Bank erosion - 2007	60	6	6	event	80.0		
10	Yes	Toe of slumps/bank erosion	30	--	6	1/4 in/yr		3.8	0.14
11	Yes	Bank erosion - 1996	12	6	8	event	21.3		
12A	Yes	Bank erosion - 2007	15	24	20	event	266.7		
12B	Yes	Bank erosion	50	--	8	0.3 in/yr		10.0	0.37
14	Yes	Bank erosion	80	--	8	1/2 in/yr		26.9	0.99
15A	Yes	Bank erosion - 2007	40	8	15	event	177.8		
15B	Yes	Bank erosion	12	9	4	event	16.0		
16A	Yes	Bank erosion - 2014	10	1	7	event	2.6		
16B	Yes	Bank erosion	10	--	7	0.1 in/yr		0.6	0.02
18	Yes	Bank erosion	10	--	3	0.1 in/yr		0.2	0.01
19	Yes	Toe of slumps	25	--	4	1/2 in/yr		4.2	0.16
20	Yes	Toe of slumps/bank erosion	200	--	8	1 in/yr		132.8	4.91
22A	Yes	Debris slides/debris avalances	50	9	3	event	50.0		
22B	Yes	Toe of slumps/bank erosion	100	--	3	0.3 in/yr		7.5	0.28
23	Yes	Toe of slumps/bank erosion	50	6	5	event	55.6		
24	Yes	Toe of slumps/bank erosion	75	12	3	event	30.0		
25	Yes	Debris flow from shallow rapid/bank erosion	20	--	6	1 in/yr		10.0	0.37
26A	Yes	Debris slides/debris avalances	30	20	3	event	66.7		
26B	Yes	Toe of slumps/bank erosion	75	--	2	0.1 in/yr		1.2	0.05
27A	Yes	Debris slides/debris avalances	30	2	10	event	10.0		
27B	Yes	Bank erosion	30	--	4	1 in/yr		10.0	0.37
28A	Yes	Debris slides/debris avalances	40	15	4	event	88.9		
28B	Yes	Bank erosion	100	--	2	0.3 in/yr		5.0	0.19
29	Yes	Toe of slumps/bank erosion	20	--	2	1/4 in/yr		0.8	0.03
31	Yes	Toe of slumps/bank erosion	30	--	7	1/4 in/yr		4.4	0.16
32	Yes	Debris slides/debris avalances	10	1.5	2	event	1.1		
33	Yes	Toe of slumps/bank erosion	25	--	1	1 in/yr		2.1	0.08
34	Yes	Debris slides/debris avalances/bank erosion	60	--	6	0.1 in/yr		3.0	0.11
35	Yes	Debris slides/debris avalances	50	10	1	event	18.5		
36	Yes	Debris slides/debris avalances	60	50	3	event	5.0		
37A	Yes	Debris slides/debris avalances/bank erosion	20	--	3	0.3 in/yr		1.5	0.06
37B	Yes	Debris slides/debris avalances/bank erosion	30	--	3	0.3 in/yr		2.3	0.08
38A	Yes	Debris slides/debris avalances/bank erosion	40	40	2	event	118.5		
38B	Yes	Toe of slumps/bank erosion	40	--	2	0.3 in/yr		2.0	0.07
39	Yes	Debris slides/debris avalances/bank erosion	75	4	3	event	33.3		
41	Yes	Toe of slumps/bank erosion	30	--	10	1 in/yr		24.9	0.92
43	Yes	Bank erosion	30	--	3	0.1 in/yr		0.7	0.03
44	Yes	Debris slides/debris avalances/bank erosion	40	20	1	event	29.6		
45A	Yes	Bank erosion	50	--	4	0.1 in/yr		1.7	0.06
45B	Yes	Bank erosion	20	--	4	0.1 in/yr		0.7	0.02
46	Yes	Bank erosion	20	--	2	0.1 in/yr		0.3	0.01

Total Delivery	**1,230**	270	**10**
Number of Years in Event-driven History	**17**		
Annual Average Sediment Delivery	**72**		**10**
Total Annual Average Sediment Delivery	**82**	**CY**	

Notes:
CY = cubic yards
ft = foot
ft^3 = cubic foot
in/yr = inch per year



Note: The points represent all of the locations visited in Meadowdale Beach Park and Lund's Gulch and show the extent of the area covered during the geologic reconnaissance in December 2014. See Figure 2 for more detail.

Meadowdale Beach Park Feasibility Study
Geotechnical Assessment & Sediment Loading
Snohomish County, Washington

VICINITY MAP

August 2015 21-1-22034-001

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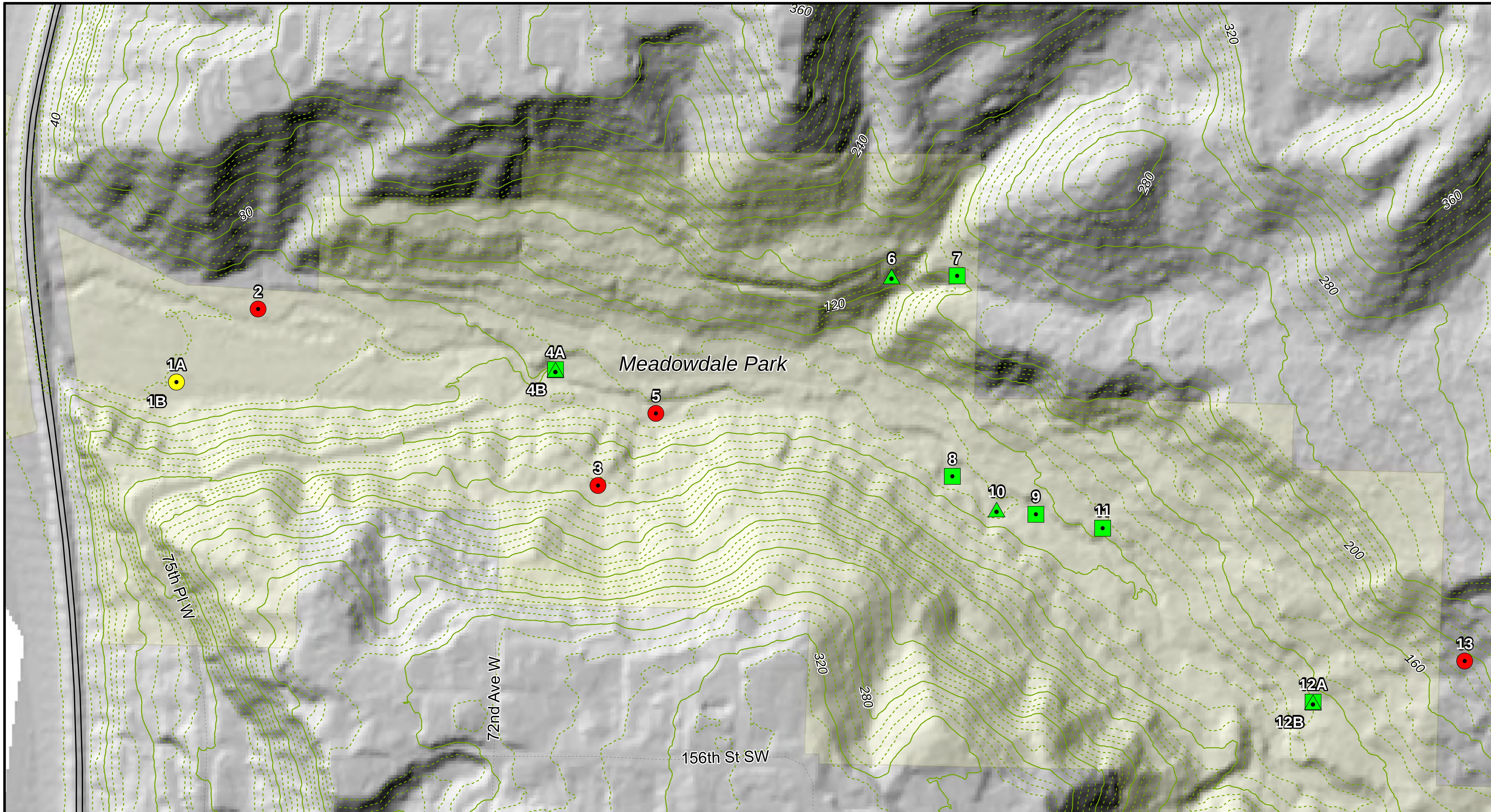
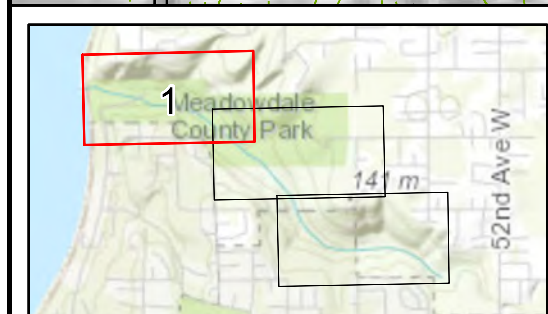
FIG. 1

Filename: T:\Project\21-1\22034_Meadowdale\AV_mxd\Fig1_Vicinity_Meadowdale.mxd Date: 7/30/2015 SAW





LEGEND

Observation By Type

Sed Input	Delivery
Yes	Event
N/A	Incremental
No	N/A

Ground surface data provided by Puget Sound LiDAR Consortium.
Note:
NA for Delivery = sites not considered sediment sources for this study.

0 200 400
Feet

N W E S

Meadowdale Beach Park Feasibility Study
Geotechnical Assessment and Sediment Loading
Snohomish County, Washington

SITE AND EXPLORATION PLAN

August 2015 21-1-22034-001

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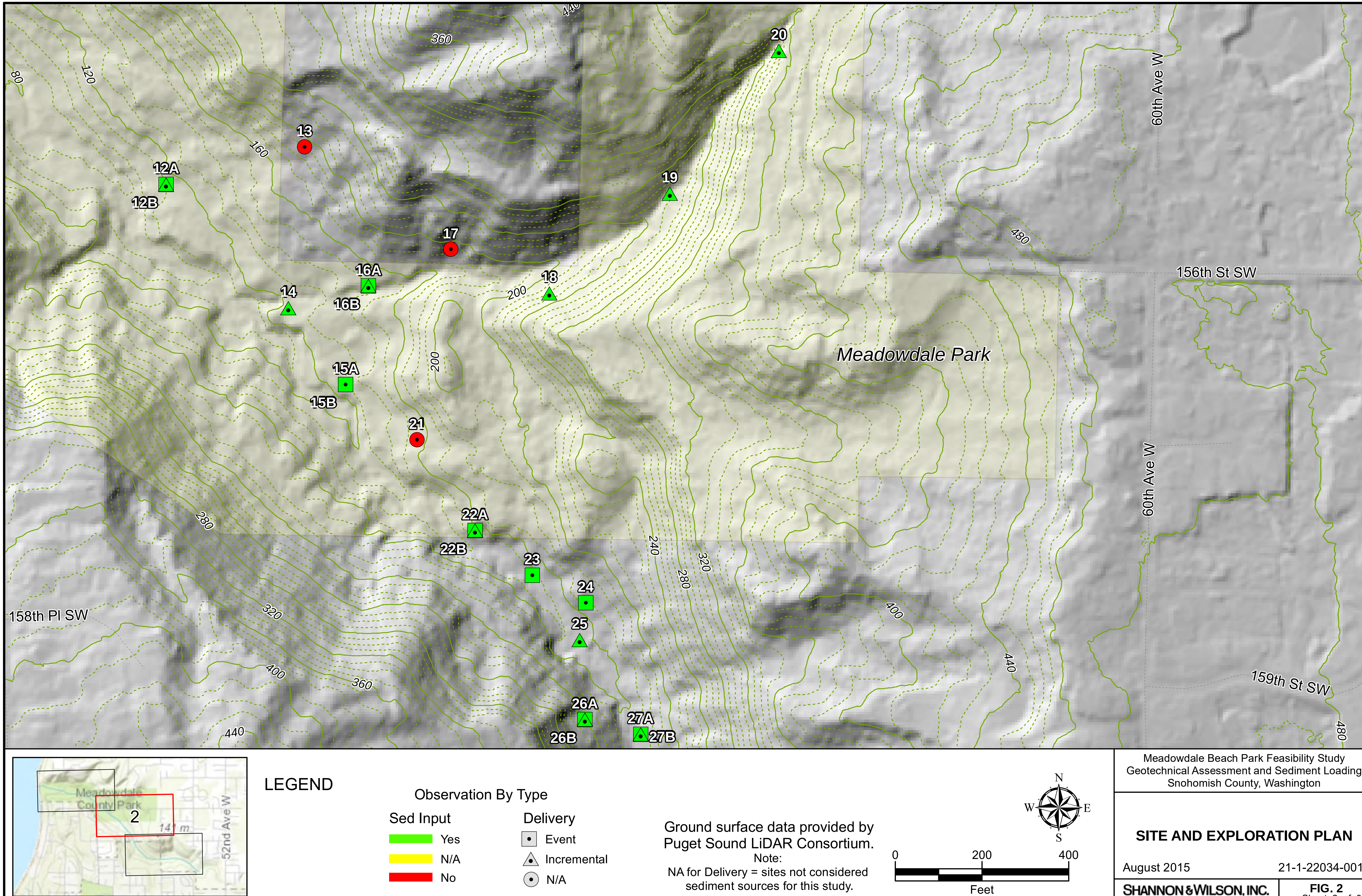
FIG. 2
Sheet 1 of 3



Ground surface data provided by Puget Sound LiDAR Consortium.

Note:
NA for Delivery = sites not considered sediment sources for this study.

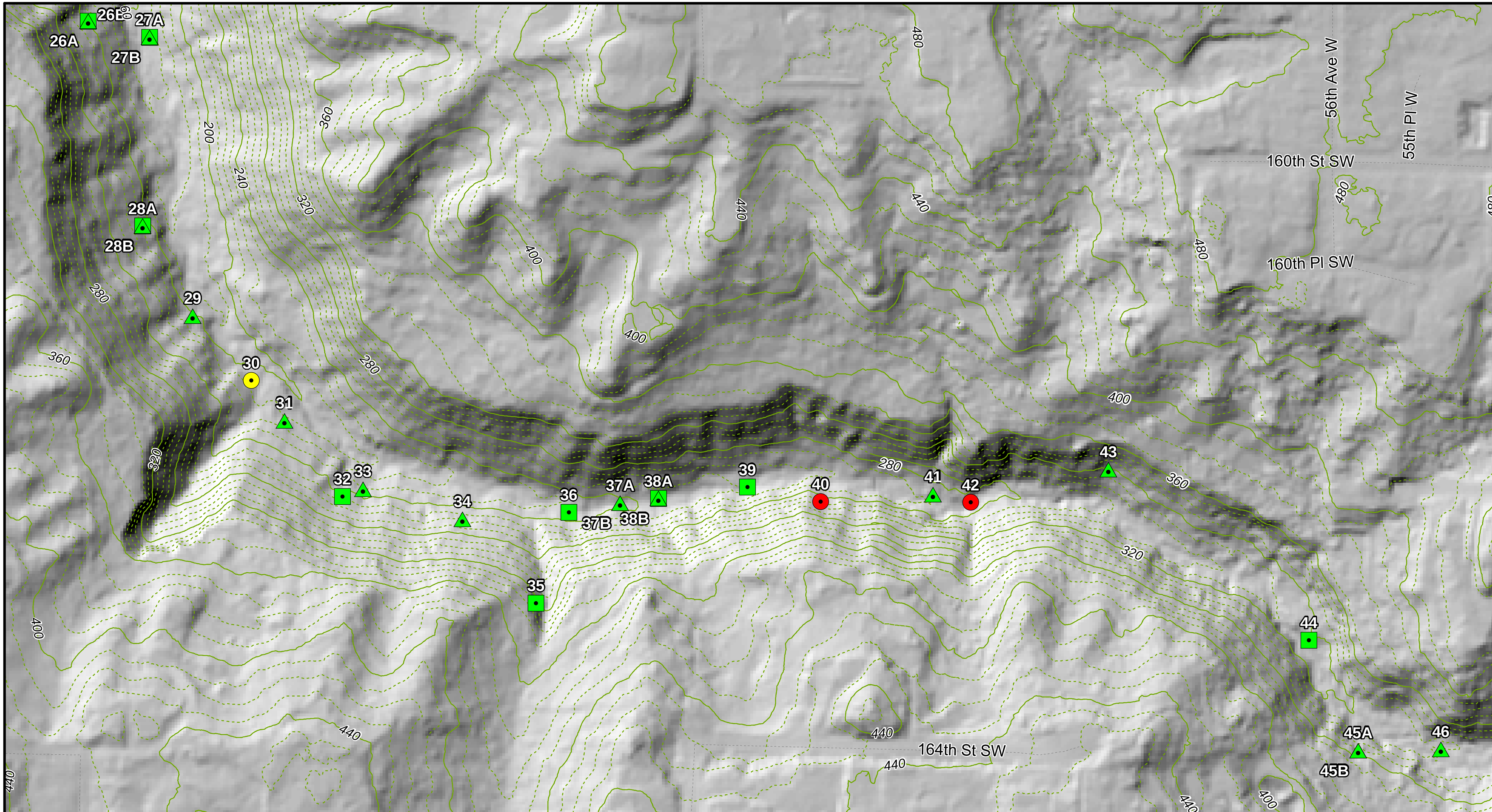
Meadowdale Beach Park Feasibility Study
Geotechnical Assessment and Sediment Loading
Snohomish County, Washington

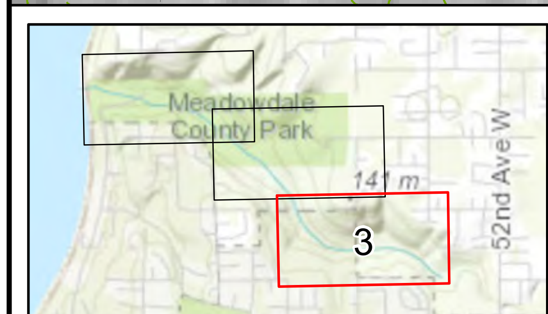
SITE AND EXPLORATION PLAN

August 2015 | 21-1-22034-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2
Sheet 2 of 3





LEGEND

Observation By Type

Sed Input		Delivery	
(green)	Yes	▪	Event
(yellow)	N/A	▲	Incremental
(red)	No	•	N/A

Ground surface data provided by Puget Sound LiDAR Consortium.

Note:
NA for Delivery = sites not considered sediment sources for this study.

0 200 400
Feet

N
W E
S

Meadowdale Beach Park Feasibility Study
Geotechnical Assessment and Sediment Loading
Snohomish County, Washington

SITE AND EXPLORATION PLAN

August 2015 21-1-22034-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2
Sheet 3 of 3

Sand and gravel colluvium stored in stream bank 650 feet upstream of culvert. May entrain at next high water event.

Loc ID #1B - Sand and gravel pile removed from culvert after last winter. Estimated at 33 cubic yards.

Culvert upstream where stream is funneled into culvert/tunnel.

Culvert/tunnel downstream to delta, channelized for ~85 feet.

Delta looking southwest toward Edmonds.

Delta looking north toward stream outlet and Picnic Point.

Figure 3. Sediment accumulation downstream in Lund's Gulch. Photos from December 2014 field visit.

Loc ID 9 – North side of Lund's Gulch, lower half. Soil rap trail repair, estimated 80 cubic yards input during 1996/1997 event.

Loc ID 12A – North side of Lund's Gulch, lower half. Trail repair from estimated 267 cubic yards of bank lost in 2007/2008 event.

Loc ID 15B – North side of Lund's Gulch, lower half. Bank erosion reactivated in recent event, total estimated 18.5 cubic yards input.

Loc ID Stop 22A – South side of Lund's Gulch, upper half. Colluvium detached from till slope. Estimated 50 cubic yards input during event.

Loc ID 28A – South side of Lund's Gulch, upper half. Colluvial fan with source ~100-150 feet upslope. Estimated 89 cubic yards input.

Loc ID 44 – South side of Lund's Gulch, upper half. Fresh sand slough, colluvium moved downstream. Estimated 29.6 cubic yards input.

Figure 4. Event driven sediment input to Lund's Gulch. Photos from December 2014 field visit.

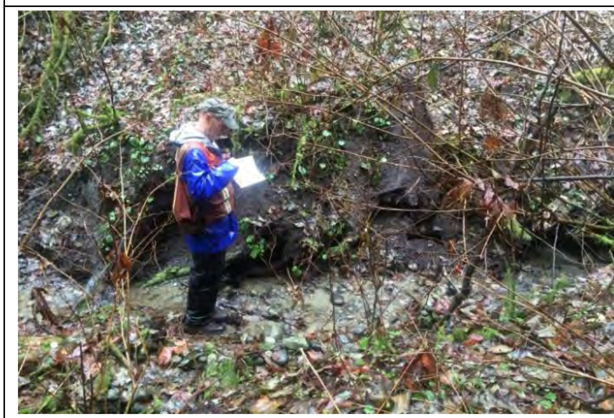
	
Loc ID 10 – South side of Lund’s Gulch, lower half. Continual erosion of wet colluvial slope. Estimated 0.12 cubic yards annual input.	Loc ID 14 – North tributary drainage incising colluvium bank between trail and Lund’s Gulch. Estimated at 1 cubic yards annual input.
	
Loc ID 19 – North tributary to Lund’s Gulch, lower half. Estimated 5 cubic yards annual input from tributary to Lund’s Gulch.	Loc ID 22B – South side of Lund’s Gulch, upper half. Sloughing of colluvium over till slope. Estimated 0.025 cubic yards annual input.
	
Loc ID 29 – North side Lund’s Gulch, upper half. Creek ‘nipping’ at toe of set-down bench. Estimated 0.03 cubic yards annual input.	Loc ID 43 – North side Lund’s Gulch, upper half. Bare slope direct delivery of sediment. Estimated 0.03 cubic yards annual input.

Figure 5. Incremental sediment input to Lund’s Gulch. Photos from December 2014 field visit.

Attachment to and part of Report 21-1-22034-001

Date: September 15, 2015
To: Ms. Kathy Ketteridge
Anchor QEA, LLC

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX D
ADA REGULATIONS AND GUIDELINES

The United States Access Board is an independent federal agency, created in 1973, to promote equal access to federal facilities; the board creates accessibility guidelines for construction or renovation projects covered by the Americans with Disabilities Act (ADA) of 1990 and the Architectural Barriers Act (ABA) of 1968. The Access Board developed the 2010 Americans with Disabilities Act Standards for Accessible Design, which was issued by the Department of Justice and Department of Transportation (Department of Justice 2010). These standards apply for all projects that are awarded funding by the Washington State Recreation and Conservation Office (RCO). In 2014 the Access Board developed new provisions for outdoor developed areas, including trails, beach access, and picnic and viewing areas. These standards are required within outdoor areas developed by the federal government or where the federal government is in a partnership agreement with a non-federal entity, although they are not necessarily required for outdoor areas created or renovated using federal grants or loans. However, RCO's policy supports the use of the latest guidelines; thus, the 2014 guidelines will apply to RCO-funded projects when the 2010 guidelines do not cover the scope of an applicant's outdoor developed area (RCO 2015).

Definitions and Requirements

There are a number of recreation elements proposed for Meadowdale Beach Park. Defining these elements is important because, although some elements may seem very similar, in some cases these elements can have very different ADA accessibility requirements. While some of the elements are not addressed specifically in the Alternatives analysis, the ADA guidelines can be used to inform future, more detailed phases of the Park's design.

Circulation elements include trails, outdoor recreation access routes, and beach access routes. **Trails** are "a pedestrian route developed primarily for outdoor recreational purposes. Pedestrian routes that are developed primarily to connect accessible elements, spaces, and buildings within a site are not a trail." **Outdoor Recreation Access Routes (ORARs)** are "a continuous, unobstructed path that is intended for pedestrian use and that connects accessible elements, spaces, and facilities within camping and picnic facilities and at viewing areas and trailheads." A **beach access route** can be permanent or removable and is "a continuous, unobstructed path that crosses the surface of the beach and provides pedestrians access to the water."

Outdoor Constructed Features are site furnishings and utility elements and can include "picnic tables, fire rings, grills, fireplaces, wood stoves, trash and recycling receptacles, water hydrants, utility and sewage hookups, outdoor rinsing showers, benches, and viewing scopes."

Trails and ORARs must have a firm and stable surface, a clear width of 44 inches, generally, running slopes of 5% or less, cross-slopes of 2% or less for most materials, and vertical clearances of 80 inches or more. Passing or turning spaces are also required for trails and ORARs less than 60 inches. Passing spaces are required every 1,000 feet or at the terminus of a trail; ORARs require a passing area every 200 feet. Picnic and viewing area facilities have similar surface and slope requirements, but the size of viewing areas requires a clear space of 36 by 48 inches. Picnic facility sizes are dependent on the site furnishings (outdoor constructed features), which they contain.

Space elements include picnic facilities and viewing areas. A **picnic facility** is "a site, or a portion of a site, that is developed for outdoor recreational purposes and contains picnic units. A picnic unit is an outdoor space in a picnic facility that is used for picnicking and contains at least one outdoor constructed feature." A **viewing area** is "an outdoor space developed for viewing a landscape, wildlife, or other points of interest" (Access Board 2014).

Table 1 summarizes the ADA accessible requirements for each recreation element. As the 2014 ADA guidance is scoped more towards recreation elements within Meadowdale Beach Park, it provides the majority of the guidance. However, there are a few aspects of Washington's adopted building code that exceed the Federal ADA standards, and in those cases the Washington (WAC) requirement is listed.

Table 1
ADA Guidelines

	Trails	ORARs	Beach Access Routes (Removable)	Outdoor Constructed Features	Picnic Facility	Viewing Area
When do accessibility requirements apply?	When the original design, function, or purpose of an existing trail is changed and the altered portion directly connects to a trailhead or other trail that is ADA accessible.	When connecting accessible elements, spaces, and facilities within camping and picnic facilities and at viewing areas and trailheads.	When entities construct or alter paths, or facilities that serve the beach or when entities undertake a beach nourishment project. Entity is not required to spend more than 20% of facility construction costs to provide beach access routes. Route must connect entry point to beach to the high tide level at tidal beaches.	Not specified	When altering or adding picnic units to an existing picnic facility.	Not specified
Minimum number of accessible elements	Only trails connecting to a trailhead or another trail that meets ADA requirements are required to comply.	At least one ORAR connecting accessible spaces (parking, viewing, picnicking, etc.). Elements that are not required to be accessible do not have to be connected by an ORAR.	One per 1/2 mile of beach shoreline administered by same entity. Number is not required to exceed the number of pedestrian access points provided to the beach.	Where outdoor constructed features are provided in common use/public use areas, at least 20%, but no less than one, of each type of feature must comply with ADA requirements.	When only one or two picnic units are provided, each must provide mobility features. When more than two units are provided, at least 20%, but no less than two, of the picnic units must provide mobility features. At a table, at least one wheelchair seating space must be provided for tables up to 9 feet long; two spaces must be provided for tables 10 to 20 feet long.	At viewing areas not located along trails, at least one ORAR must connect accessible parking spaces or other arrival points that serve the viewing areas with accessible elements, spaces, and facilities provided within the viewing area.

	Trails	ORARs	Beach Access Routes (Removable)	Outdoor Constructed Features	Picnic Facility	Viewing Area
Surface	Firm and stable, resists deformation by indentations. Paving, or compacted crushed stone or soil.	Same as Trails	Same as Trails (sand is not a firm and stable surface)	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)
Clear Width	44 inches (WAC)	Same as Trails	60 inches	Picnic tables: 36 inches on all usable sides; Fire rings/grills: 48 by 48 inches on all usable sides; Receptacles: 36 by 48 inches where there is a forward approach, 30 by 60 inches where user approaches parallel to receptacle opening; Benches: 36 by 48 inches positioned near the bench with one side of the space adjoining circulation route.	See Outdoor Constructed Features	Clear ground space of at least 36 by 48 inches at each distinct viewing location; one side of space must adjoin or overlap ORAR, trail, or other clear ground space.
Passing or Turning Spaces (required for path widths < 60 inches)	One every 1,000 feet and/or at the end of ADA segment. 60 by 60 inches or T-shaped.	One every 200 feet. 60 by 60 inches or T-shaped.	Not required	NA	NA	Turning space of a least 60 inches in diameter, or T-shaped.
Running Slope	1:20 (5 percent)	Same as Trails	Removal routes are not required to comply with requirements.	Same as Trails (for clear ground space)	NA	NA

	Trails	ORARs	Beach Access Routes (Removable)	Outdoor Constructed Features	Picnic Facility	Viewing Area
Steeper Sloped Trail Segments	5–8.33% = 200 feet max length, 8.33–10% = 30 feet max length, 10–12% = 10 feet max length	5–8.33% = 50 feet max length, 8.33–10% = 30 feet max length	Removal routes are not required to comply with requirements.	NA	NA	NA
Cross slope: Concrete, asphalt, or boards	2% max	Same as Trails	Removal routes are not required to comply with requirements.	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)
Cross slope: All other materials	5% max	Same as Trails	Removal routes are not required to comply with requirements.	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)
Resting Intervals within trail tread: Required where circulation segments exceed 5%	60 inches long and as wide as trail segment, same cross slope requirements as above.	Same as Trails	Removal routes are not required to comply with requirements.	NA	NA	NA
Resting Intervals adjacent to trail: Required where circulation segments exceed 5%	60 inches long and 36 inches wide, same cross slope requirements as above.	Same as Trails	Removal routes are not required to comply with requirements.	NA	NA	NA

	Trails	ORARs	Beach Access Routes (Removable)	Outdoor Constructed Features	Picnic Facility	Viewing Area
Object protrusion, does not apply to natural features. Object with leading edge more than 27 inches and not more than 80 inches above ground.	4 inches max protrusion, except handrails that can protrude 4.5 inches max.	Same as Trails	Same as Trails	NA	NA	NA
Protruding objects (post-mounted objects). Free-standing objects mounted on posts or pylons that are located 27 inches to 80 inches above the finish floor or ground.	12 inches max protrusion	Same as Trails	Same as Trails	NA	NA	NA
Vertical Clearance	Minimum of 80 inches high, where vertical clearance is less than 80 inches, guardrails or other barriers shall be provided and located 27 inches max above ground.	Same as Trails	Same as Trails	NA	NA	NA

	Trails	ORARs	Beach Access Routes (Removable)	Outdoor Constructed Features	Picnic Facility	Viewing Area
Openings on ground (e.g., grates)	Small enough so that a sphere more than 1/2-inch in diameter cannot pass through. Elongated openings should be placed perpendicular to dominant travel direction.	Same as Trails	Same as Trails	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)	Same as Trails (for clear ground space)

Notes:
ADA = Americans with Disabilities Act
ORAR = Outdoor Recreation Access Route
WAC = Washington Administrative Code

References

Department of Justice, 2010. 2010 ADA Standards for Accessible Design. Accessed on: March 6, 2015. Available from: http://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf.

United States Access Board, 2014. Outdoor Developed Areas: A Summary of Accessibility Standards for Federal Outdoor Developed Areas. Accessed on: March 6, 2015. Available from: http://www.access-board.gov/guidelines-and-standards/recreation-facilities/outdoor-developed-areas/a-summary-of-accessibility-standards-for-federal-outdoor-developed-areas.

WAC (Washington Administrative Code) Chapter 51-50-1101. Clear width of accessible route. Last updated on: December 17, 2003.

Washington State Recreation and Conservation Office, 2015. Technical Assistance for ADA Projects. Accessed on: March 6, 2015. Available from: http://www.rco.wa.gov/grants/ada_tech_assistance.shtml.

APPENDIX E
FISHERIES AND HABITAT EVALUATION MEMORANDUM

MEADOWDALE BEACH COUNTY PARK – FISH HABITAT BENEFITS ANALYSIS

INTRODUCTION

Snohomish County Parks is conducting a feasibility study to evaluate restoration alternatives for the Lund's Gulch Creek estuary in Meadowdale Beach County Park. The 108-acre park encompasses the lowermost 1 mile of Lund's Gulch Creek and approximately 750 feet of Puget Sound shoreline. The BNSF railroad line runs along the shoreline of the park, separating the lower lawn and upland portion of the park from the large creek delta that is present waterward of the railroad tracks.

Currently, Lund's Gulch Creek flows through a 6 foot wide by 7 foot tall box culvert through the railroad embankment. The box culvert is also the only legal access for park users to reach the beach. The box culvert does not function adequately as the creek conduit or for people's access to the beach. The box culvert is significantly undersized for a creek system the size of Lund's Gulch Creek. As a result, creek flows are partially impounded upstream of the culvert during high flows which causes flooding in the park and deposition of large quantities of stream sediment. The sediments accumulate in and upstream of the box culvert which impacts creek habitat, fish movements, and park visitor access to the beach. Maintenance of this culvert by county requires several permits and can only be performed during specific time periods (work windows) defined in the permits. In the last several years maintenance actions have been unable to sustain clear access for fish or people due to the excessive volume and frequency of gravel deposition within and upstream of the culvert.

As part of the feasibility study for addressing the problems at the culvert, three alternatives are being evaluated. Each alternative includes constructing a railroad bridge to provide a wider opening for the creek, providing a separate pedestrian path adjacent to the creek restoring the upper estuary (transition zone) and lower stream, and restoring and enhancing riparian habitat. The conceptual alternatives are described in more detail in the main feasibility report document being prepared by Anchor QEA. The project area for the restoration work extends from the railroad crossing to the pedestrian bridge over Lund's Gulch Creek near the Park Ranger's house. This encompasses the lowermost 800 feet of the creek length.

This memorandum describes an evaluation of the relative fish and habitat benefits associated with each of the restoration alternatives. The memorandum is organized to first provide an overview of fish resources and existing habitat conditions. Next, an evaluation of the fish and habitat benefits of each alternative is presented. The memorandum concludes with a section describing a summary of findings.

FISH RESOURCES

Several species of salmonids utilize Lund's Gulch Creek including Chinook, coho, chum, steelhead, and sea-run cutthroat trout. Salmon spawning ground surveys document coho and chum salmon spawning each year. Salmon return data collected by community volunteers since 1997 indicate that in some years more than 100 adult coho or chum would return to the creek; however, most recently the numbers have been lower (Uusitalo pers. comm.). The last time more than approximately 100 coho adults returned was 2001 with numbers ranging between 2 and more than 35. Chum adults numbers have been higher, but ranging between approximately 15 and more than 75 since 2008. Coho and chum spawning occurs in the lower portions of the creek and in years when higher numbers of adults return the spawning occurs over a wider area.

In addition to any fry produced by adult coho and chum salmon spawning in the creek, hatchery origin fry have been released into the creek for many years (Uusitalo pers. comm.). Approximately 10,000 chum fry (Chico Creek origin from Suquamish Tribe) and 1,000 coho fry (Wallace River origin from WDFW) are released in the spring each year by a retired school teacher who has been releasing fish in the creek since the 1980s (Uusitalo pers. comm.).

Sea-run cutthroat trout also spawn and rear in the Lund's Gulch Creek system. Pfeifer (1979) documented sea-run cutthroat trout throughout Lund's Gulch Creek, including headwater areas outside of the park.

Only two separate observations of steelhead adults have been reported and both were for only one adult. Pfeifer (1979) referenced Don Hendricks (WDFW) observation of a single steelhead adult in Lund's Gulch Creek, presumably in the late 1970s. More recently, Tom Murdoch of the Adopt A Stream Foundation reported seeing one steelhead adult relatively high in the system (Murdoch pers. comm.).

Juvenile Chinook, coho, and chum salmon were documented in the lower 650 feet of the creek in a study by Beamer et al. (2013). Since the creek does not provide habitat for Chinook spawning, the presence of juvenile Chinook salmon indicates that the fish originated in other river systems, outmigrated to Puget Sound, and during their movements and rearing along the marine nearshore they moved back into the available freshwater habitat associated with Lund's Gulch Creek.

Other fish species documented in the creek are starry flounder and sculpins (Pfeifer 1979, Adopt A Stream Foundation 2013). Starry flounder are entering the lower creek from the Puget Sound shoreline. Sculpin distributions in the creek are generally restricted to the lower reaches of Lund's Gulch Creek due to partial barriers inadvertently created by vertical drops downstream of log structures installed for restoration (Lantz et al. 2014).

EXISTING HABITAT CONDITIONS

Despite supporting various life stages of multiple salmonid species, habitat conditions in Lund's Gulch Creek are degraded. In the Lund's Gulch Creek watershed beyond the park and gulch, there has been extensive development which has affected the natural processes of the creek, most notably changing the flow patterns and erosion associated with storm events (Snohomish County 2002). Compared to natural flow conditions, the conversion of watershed areas from vegetated to impervious surfaces results in rainfall events resulting in higher peak flows that then subside more quickly. This creek "flashiness" results in more erosive power during the peak flow and shorter period of increased flows to support natural channel and riparian processes. The creek also erodes more sediment which results in large pulses of stream gravel being transported through the creek system. These changes in the upper watershed affect habitat conditions throughout the watershed, including the estuary and mouth of the creek which are the focus of the proposed restoration.

Within the project area, the railroad embankment is a significant feature affecting aquatic habitats upstream and downstream of it. Following is a description of the fish habitat in the project area starting on the beach and continuing upstream to the pedestrian bridge near the Park Ranger's house. Appendix A provides a series of site photographs documenting representative conditions in the project area.

Waterward of the railroad crossing is a large tributary delta. There is a sand spit angling to the north due to the net shore drift of sediment tending to move material to the north in this part of Puget Sound. Currently, the creek flows out from the culvert and turns to the north behind the sand spit. In this way, the sand spit reduces the amount of wave energy reaching the estuary's tidal channel and semi-protected rearing habitat is provided for juvenile salmon. This semi-protected area is called a pocket estuary and studies have shown that this type of habitat is utilized by higher densities of juvenile Chinook than other nearshore habitats (Beamer et al. 2006). The channel alignment across the delta changes over time, but regardless of alignment the area functions as a pocket estuary.

The railroad embankment on the Puget Sound shoreline and the undersized culvert that flows through it significantly impair the ecological processes and habitats in the creek and estuary. Lund's Gulch Creek flows through a 6 foot wide by 7 foot tall box culvert that is approximately 80 feet long and provides the route for the creek as well as pedestrian access to the beach. This culvert width is undersized given the size of the watershed and as evidenced by wetted widths in unconstrained areas upstream ranging between 13 and 18 feet during a dry winter day and bankfull widths ranging between 15 and 35 feet. Often during high flow conditions, water backs up above the culvert and floods adjacent areas. High flows events also commonly cause the deposition of several cubic yards of sediment at the upstream end of the box culvert (Dailer pers. comm.). This material restricts the movement of fish into and out of the creek. The sediment also deposits on adjacent park recreational areas so it is excavated out of the creek and stockpiled elsewhere in the park (Dailer pers. comm.).

The railroad crossing and culvert also prevent the establishment of a natural transition between freshwater and saltwater. The culvert confines the creek to an artificially narrow corridor and for another 20 feet upstream of the culvert the creek remains confined in a concrete channel. The current conditions do not allow for a natural estuary to establish upstream of the railroad embankment, although the elevations and creek size are sufficient to support one. Instead of supporting a wider creek delta and estuarine area, this is currently the narrowest part of the creek because it enters the concrete channel forming the box culvert. The creek is confined to the narrow channel and fill material has been placed to raise adjacent areas.

In the lowermost 300 feet of Lund's Gulch Creek, the creek is confined by rock and logs parallel to the bank. This bank armoring was installed with several small wood structures for habitat purposes in approximately 2001. However, over the next 8 years, the total quantity of wood in this reach declined by 40 percent (from 40 to 24 pieces, Snohomish County 2009). Currently, the wood structures that were installed appear to create partial barriers at some flows as water goes under and over the wood spanning the creek. The reach provides some pockets of gravel, some cover along the banks, and a series of small pools (19% of area). At the upstream end of this reach, the creek is unconstrained and the absence of an established high flow berm allows the creek to overtop its bank and flood across the park lawn area. Part of the proposed restoration would be to address the problems in this reach by re-meandering or rerouting the creek. The width of the riparian corridor is narrow through most of this reach (less than 25 feet), but increases near the upstream end (up to approximately 50 feet).

In the next 500 feet upstream (i.e., from 300 feet to 800 feet from culvert), the creek is wider and contains a series of riffles and pools. More wood structures were placed in this reach in approximately 2001. These structures create some pool habitat. These structures also appear to be only partially achieving their intended function. The reach provides a good mix of gravel and cobble substrate. There is some off-channel habitat provided by a backwater area that is more connected during high flows. The riparian corridor in this reach is wider (approximately 50 to 80 feet) than the downstream reach.

ANALYSIS OF ALTERNATIVES

All three alternatives entail addressing the undersized culvert at the mouth of the creek, restoring the estuary upstream of the railroad crossing, and restoring instream and riparian habitat in the lowermost reaches of Lund's Gulch Creek. All three alternatives replace the culvert with a trestle bridge for the railroad that meets or exceeds the minimum width needed to transport sediment from the creek to the beach. The minimum width was calculated by Anchor QEA as described in the feasibility report. Thus, all three alternatives alleviate the sediment deposition upstream of the railroad crossing which has caused problems for fish passage, pedestrian use, and park maintenance.

The degree to which the alternatives address the habitat criteria varies among alternatives. Table 1 characterizes the relative benefits of each alternative in addressing each of the habitat related criteria established for the project. For each criterion, the relative benefits of the three alternatives were summarized symbolically by assigning + (least benefit), ++, or +++ (greatest benefit).

CONFLUENCE
ENVIRONMENTAL COMPANY

Table 1. Evaluation of Relative Habitat Benefits of Each Alternative

Criterion	Alternative 1	Alternative 2	Alternative 3
Quantity and Diversity of Nearshore Habitat Waterward of Railroad Crossing	**++** This alternative would restore the natural delivery of sediment to the estuary and nearshore and result in more sediment reaching the beach than currently occurs. This is due because in existing conditions, the material that gets impounded upstream of the culvert is removed from the creek by maintenance crews and stockpiled/used elsewhere in the park. The additional material delivered to the beach would be naturally redistributed over time through ecosystem processes occurring in the nearshore and contribute to sustaining the delta formation at the creek mouth. In addition to changes in sediment delivery from the creek, the nearshore areas waterward of the railroad crossing would be expected to encounter some changes to the hydraulic forces of creek flows into the nearshore. The widening of the creek mouth would lessen the stream power because the water would be spread out across a wider area before entering the nearshore. These changes to hydraulic forces and sediment delivery could beneficially result in a more naturally dynamic channel network. Since this alternative keeps the outlet of the creek in roughly the same location there is less uncertainty (compared to Alternative 2) about inadvertently disrupting processes and impacting habitats waterward of the railroad crossing.	**+** The analysis presented for Alternative 1 also applies to Alternative 2, except for the uncertainty associated with relocating the creek outlet to a more northerly position in the park. The delivery of creek water and sediment to a new location would be expected to result in more readjustment of the delta than the other alternatives. Over time, the delta would shift north in response to the new creek location. It is difficult to anticipate whether such a shift would positively or negatively affect nearshore habitat quantity or diversity. The overall effect of the alternative would be favorable for nearshore habitat because of the restoration of the sediment delivery, however, but there are some detrimental impacts to habitats that would be expected to occur. There would be impacts to the nearshore habitats between existed and proposed alignment of the creek. Currently, the creek's channel turns to the north after flowing through the railroad corridor. These estuarine channels provide favorable rearing habitats for juvenile salmonids. The proposed creek alignment would shorten the length of the estuary channel before entering Puget Sound, thereby reducing the amount of protected channel habitat.	**+++** The analysis presented for Alternative 1 also applies to Alternative 3, except that Alternative 3 would provide more opportunity for multiple estuarine channels to form. This alternative restores a more natural connection between the upper estuary and Puget Sound than is provided by the other alternatives. The wider connection between the upper estuary (i.e., upstream of railroad) and nearshore will allow for more dynamic and diverse habitats to form over time. The natural delivery of sediment to the nearshore would provide more areas at the proper elevations to support emergent marsh vegetation.

Criterion	Alternative 1	Alternative 2	Alternative 3
Juvenile Salmon Fish Passage Conditions into Lower Creek	**+++** All three alternatives would be expected to eliminate the periodic fish passage issues that sediment deposition in the culvert currently creates.	**+++** All three alternatives would be expected to eliminate the periodic fish passage issues that sediment deposition in the culvert currently creates.	**+++** All three alternatives would be expected to eliminate the periodic fish passage issues that sediment deposition in the culvert currently creates. This alternative provides the greatest certainty over time that channel formation and vegetation growth in the upper estuary coupled with changes in tidal inundation associated with sea level rise will not affect unimpeded juvenile salmon passage between habitats.
Size of Transition Zone between Saline and Freshwater Habitats	**+** This alternative would restore the smallest transition zone area (shown in figure as Restored Brackish Wetland). The approximately 0.6 acre size of the transition zone in this alternative is similar to historic marsh/cultivated area (joint category) mapped at the site in the 1872 topographic sheet ("t-sheet").	**++** This alternative provides an intermediate size transition zone of approximately 1 acre. The restored transition zone is larger than the historic marsh/cultivated area (joint category) mapped in the 1872 t-sheet. In the absence of information about modifications impacting the conditions observed in 1872, this alternative provides additional area for the transition zone to naturally develop and adapt to changes in tidal inundation associated with sea level rise. It is possible that part of the transition zone in this alternative will support a freshwater wetland immediately adjacent to the salt marsh.	**+++** This alternative provides the largest transition zone among the alternatives. The approximately 1.6 acre size of the transition zone provides the most room for the estuary and lower creek to naturally adapt to the restored conditions, as well as future changes in tidal inundation associated with sea level rise. This alternative would provide the largest area for a natural transition from a freshwater wetland to salt marsh.
Quality of Lund's Gulch Creek Habitat	**+++** All three alternatives would improve the quality of habitat in Lund's Gulch Creek by re-meandering the alignment, widening the creek corridor by removing bank armoring, and improving instream habitat.	**+++** All three alternatives would improve the quality of habitat in Lund's Gulch Creek by re-meandering the alignment, widening the creek corridor by removing bank armoring, and improving instream habitat.	**+++** All three alternatives would improve the quality of habitat in Lund's Gulch Creek by re-meandering the alignment, widening the creek corridor by removing bank armoring, and improving instream habitat.

Criterion	Alternative 1	Alternative 2	Alternative 3
Quantity and Quality of Riparian Vegetation along Stream and Nearshore	**+++** All three alternatives would improve the quality and quantity of riparian vegetation along the creek. This would occur by widening the vegetated corridor along the lower creek and upper estuary. In addition, it is anticipated that coniferous and deciduous trees would be planted to improve conditions in the existing riparian corridor. All three alternatives would also provide the opportunity to plant additional riparian vegetation in the upland portion of the delta waterward of the railroad crossing. The extent of this is expected to depend more on the compatibility of the vegetation with the railroad right-of-way rather than differences between the alternatives.	**+++** All three alternatives would improve the quality and quantity of riparian vegetation along the creek. This would occur by widening the vegetated corridor along the lower creek and upper estuary. In addition, it is anticipated that coniferous and deciduous trees would be planted to improve conditions in the existing riparian corridor. All three alternatives would also provide the opportunity to plant additional riparian vegetation in the upland portion of the delta waterward of the railroad crossing. The extent of this is expected to depend more on the compatibility of the vegetation with the railroad right-of-way rather than differences between the alternatives.	**+++** All three alternatives would improve the quality and quantity of riparian vegetation along the creek. This would occur by widening the vegetated corridor along the lower creek and upper estuary. In addition, it is anticipated that coniferous and deciduous trees would be planted to improve conditions in the existing riparian corridor. All three alternatives would also provide the opportunity to plant additional riparian vegetation in the upland portion of the delta waterward of the railroad crossing. The extent of this is expected to depend more on the compatibility of the vegetation with the railroad right-of-way rather than differences between the alternatives.
Quality of Freshwater Wetland	**+** This alternative would provide a small area in the northwest corner of the restored marsh where an existing freshwater wetland may be sustained. Otherwise, the alternative only provides for a salt marsh.	**+++** This alternative would provide a small area in the northwest corner of the restored marsh where an existing freshwater wetland may be sustained. In addition, the size of the transition zone (shown in figure as Restored Brackish Wetland) would be expected to provide enough space for some freshwater wetland habitat to form, particularly in the southeast corner of the restored marsh. This will depend in part on elevations (likelihood of tidal inundation) and freshwater seepage into these edge areas.	**++** This alternative would provide a natural transition of vegetation from freshwater wetland to salt marsh along the creek corridor. The size of the transition zone is large enough that as the site evolves over time there would be enough space for freshwater wetlands to become established, particularly in the southeast corner of the restored marsh. This will depend in part on elevations (likelihood of tidal inundation) and freshwater seepage into these edge areas..

Criterion	Alternative 1	Alternative 2	Alternative 3
Habitat Connectivity for Non-fish Species	**+** All three alternatives would provide a restored riparian corridor that would benefit non-fish species, including birds and small mammals. All three alternatives would also support animal movement between the creek and beach, depending on the animal's willingness to go under the railroad bridge. The potential differences in habitat benefits would also be related to the size of the restored area and the potential for separation from park users. Since this alternative would provide the smallest transition zone, the habitat connectivity benefits for non-fish species are the least among the alternatives.	**++** All three alternatives would provide a restored riparian corridor that would benefit non-fish species, including birds and small mammals. All three alternatives would also support animal movement between the creek and beach, depending on the animal's willingness to go under the railroad bridge. The potential differences in habitat benefits would also be related to the size of the restored area and the potential for separation from park users. Since this alternative would provide the intermediate size transition zone, the habitat connectivity benefits for non-fish species are intermediate among the alternatives.	**+++** All three alternatives would provide a restored riparian corridor that would benefit non-fish species, including birds and small mammals. All three alternatives would also support animal movement between the creek and beach, depending on the animal's willingness to go under the railroad bridge. The wider bridge opening in this alternative would provide more room for animals to move under the bridge. The potential differences in habitat benefits would also be related to the size of the restored area and the potential for separation from park users. Since this alternative would provide the largest transition zone, the habitat connectivity benefits for non-fish species are the greatest among the alternatives.

SUMMARY AND RECOMMENDATIONS

All three alternatives entail restoring the Lund's Gulch Creek connection to Puget Sound by constructing a railroad bridge that will alleviate the flooding and sediment impoundment problems that currently exist due to the significantly undersized culvert. Each alternative also includes restoration of the upper estuary (transition zone), lower creek, and riparian corridor. As a result, all three alternatives would significantly improve habitat conditions in Lund Gulch Creek, its estuary, and the nearshore. The differences in the benefits for ecological restoration and fish habitat are primarily related to the size of the bridge opening and the size of the restored transition zone. Habitat benefits are of greater magnitude and higher certainty with a wider bridge opening and a larger transition zone. As the alternative with the widest bridge opening and the largest transition zone, Alternative 3 provides the greatest benefits for the habitat criteria evaluated and will best restore stream, estuarine, and nearshore processes in the project area (summarized in Table 2). The width of the bridge opening and the large transitions zone included in Alternative 3 provide the highest degree of certainty that there is sufficient area for the restored habitats to naturally evolve and adapt to changing conditions over time, such as increased tidal inundation resulting from sea level rise. Alternative 3 would provide the greatest resilience for the park to adapt to changes associated with sea level rise and a changing climate.

Table 2. Summary of Relative Habitat Benefits of Each Alternative

Criterion	Alternative[a]		
	1	2	3
Quantity and Diversity of Nearshore Habitat Waterward of Railroad Crossing	++	+	+++
Juvenile Salmon Fish Passage Conditions into Lower Creek	+++	+++	+++
Size of Transition Zone between Saline and Freshwater Habitats	+	++	+++
Quality of Lund's Gulch Creek Habitat	+++	+++	+++
Quantity and Quality of Riparian Vegetation along Stream and Nearshore	+++	+++	+++
Quality of Freshwater Wetland	+	+++	++
Habitat Connectivity for Non-fish Species	+	++	+++

Note: a) the relative benefits of the three alternatives were summarized symbolically by assigning + (least benefit), ++ (intermediate benefit), or +++ (greatest benefit).

The possible relocation of the creek mouth to a more northerly location as shown in Alternative 2 is not justified for habitat purposes. The proposed relocation does not restore the creek to an historic alignment. The relocation would be expected to have a negative impact on habitat conditions waterward of the railroad because it would shorten an estuarine channel system that currently provides more productive rearing habitat for juvenile salmonids.

Overall, the Meadowdale County Park project provides a meaningful opportunity to restore habitats and ecosystem processes. In addition to providing significant habitat benefits, restoration in park settings offer exceptional opportunities to educate people on the natural resources of the park, the purposes of individual habitat components, and the importance of self-sustaining designs.

REFERENCES

Adopt A Stream Foundation. 2013. Lunds Gulch Creek Rapid Assessment. Available at: http://www.streamkeeper.org/aasf/Lunds_Gulch_Creek.html.

Beamer, E.M., A. McBride, R. Henderson, J. Griffith, K. Fresh, T. Zackey, R. Barsh, T. Wyllie-Echeverria, and K. Wolf. 2006. Habitat and Fish Use of Pocket Estuaries in the Whidbey Basin and North Skagit County Bays, 2004 and 2005. Skagit River System Cooperative. January 16, 2006. Available at: http://www.skagitcoop.org/documents/EB2207_Beamer_et_al_2006.pdf

Beamer, E.M., W.T. Zackey, D. Marks, D. Teel, D. Kuligowski, and R. Henderson. 2013. Juvenile Chinook Salmon Rearing in Small Non-Natal Streams Draining into the Whidbey Basin. Skagit River System Cooperative. December 3, 2013. Available at: http://www.skagitcoop.org/documents/EB2752_Beamer%20et%20al_2013.pdf.

Dailer, D. pers. comm. Discussion between Doug Dailer, Park Ranger at Meadowdale Beach County Park, and Paul Schlenger, Confluence Environmental Company, during field data collection on February 20, 2015.

Lantz, D.W., H.B. Berge, and R.A. Tabor. 2014. Effects of Small Barriers on the Distribution of Sculpins (*Cottus* spp.) in Puget Sound Lowland Streams. Poster presented at the 2014 Salish Sea Ecosystem Conference in Seattle, Washington. Available at: http://your.kingcounty.gov/dnrp/library/water-and-land/science/SalishSea-2014/04POSTER-2014-04-30-Lantz-Berge-Tabor-Effects-of-small-barriers-on-distribution-of-sculpins.pdf.

Murdoch, T. pers. comm. Telephone conversation between Tom Murdoch, Executive Director of Adopt A Stream Foundation, and Paul Schlenger, Confluence Environmental Company, on March 9, 2015.

Pfeifer, R.L. 1979. A Survey of Lund's Gulch Creek in Edmonds, Washington. Washington State Game Department. February 1979.

Snohomish County. 2002. Puget Sound Tributaries Drainage Needs Report DNR No. 11. Prepared by Snohomish County Surface Water Management Division.

Snohomish County. unpubl. Unpublished data collected by Snohomish County Surface Water Management in 2009. Data provided by Frank Leonetti.

Uusitalo, D. pers. comm. Telephone conversation between Duane Uusitalo, retired school teacher who rears and releases hatchery salmon, and Paul Schlenger, Confluence Environmental Company, on March 9, 2015.

TABLE OF CONTENTS

Tables

Appendices

APPENDIX F
RAILROAD INFRASTRUCTURE EVALUATION MEMORANDUM

Feasibility Study

Replacement of a Culvert With a Railroad Bridge

Meadowdale Beach Park, Edmonds, Washington

Date: September 14, 2015
(Revised from April 13, 2015)
Project No. 15768.000

444 Cedar Street, Suite 1500
Saint Paul, MN 55101
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tkda.com

TKDA

SAINT PAUL, MINNESOTA

September 14, 2015 (revised from April 13, 2015)

Feasibility Study

Railroad Infrastructure Analysis

Meadowdale Beach Park, Edmonds, Washington

TKDA Project No. 15768.000

CERTIFICATION

Feasibility Study

Railroad Infrastructure Analysis

Meadowdale Beach Park, Edmonds, Washington

1. BACKGROUND

Meadowdale Beach Park is located at 6026 156th Street Southwest in Edmonds, Washington. It is located on 108 acres situated at the north end of Browns Bay in Puget Sound. Lund's Gulch Creek runs the length of the park and flows into Browns Bay through a 6-foot-wide by 5.5-foot-high concrete cast-in-place box culvert built in the late 1800s. The construction of the box culvert permanently altered the beach ecology by limiting tidal influences and preventing the typical characteristic delta formation associated with coastal streams. In 1987, a Snohomish County/BNSF Railway Company agreement allowed for the shared use of the culvert for both the creek and pedestrians. The box culvert has become a fish barrier, either stranding fish on the park side and preventing migration to the sound or barring fish from entering a spawning and rearing habitat. The County now seeks to restore the natural delta formation by facilitating the tidal flow through the railroad embankment. The proposed project will replace the existing box culvert structure with a new BNSF railroad bridge, which will provide an open tidal channel.

2. EVALUATION

2.1. Data Collection

The first step of the feasibility study was gathering the following data:

- BNSF track charts.
- Plans for existing structures. No plans were found.
- Existing survey. Minimal survey is available.
- Preliminary discussion of the project with BNSF Railway Company. BNSF indicated that 20-foot track centers are required at the bridge.

The following data will be needed to complete final design:

- Geotechnical foundation recommendations.
- Additional topographic survey of the existing embankment and track.

2.2. Existing Track Embankment

BNSF operates on two mainline tracks through the Meadowdale Beach Park area: Main 1 track (west track) and Main 2 track (east track). The corridor, a segment of the BNSF Scenic Subdivision (LS 50, MP 21.8; Seattle, WA to Wenatchee, WA), has a high daily volume of railroad traffic. In preliminary discussions, BNSF has indicated that, due to the high volume of traffic, work windows will be limited to a maximum of six hours.

The track charts show that the location of the proposed bridge is in a spiral curve transitioning from a 1 degree 6 minute curve to a 4 degree 11 minute curve. The allowable track speed is 45 mph and may not be reduced in the new track alignment.

The railroad corridor through the project area has significant constraints that require more expansive survey data for final design including:

- BNSF right-of-way limits.
- Existing embankment bordering Puget Sound.
- Existing track alignment.
  - The track charts represents the intended design of the track alignment. The railroad will require a survey of the alignment to capture the as-built condition of the track.
- Existing track centers.

However, available LiDAR, aerial photographs, and site survey obtained as part of this work from DHA Surveyors available for the project site is adequate to inform the feasibility study for development of proposed bridge concepts at the site.

2.3. Proposed Track and Embankment

BNSF is requiring a 20-foot distance between track centerline for the length of the proposed bridge. Without a survey of the existing tracks, we are not able to develop a proposed track realignment. However, based on the project's constraints, only one option that is feasible. Due to the constraint of the Puget Sound, the railroad embankment cannot be expanded to the west. Based on satellite imagery, the existing track centerlines at the location of the proposed bridge are approximately 14 feet. To gain the required 20-foot track centers at the bridge, the east track will have to be moved to the east approximately 6 feet. The realignment of the east track will require widening the embankment.

2.4. Proposed Trail

As part of the project, a trail is to be located below the bridge. The minimum vertical clearance for the trail is 7 feet. The proposed trail is located under the southern first span.

2.5. Bridge Options

The primary goal of the bridge type selection compares the waterway opening with the associated costs. Thereby, the waterway opening is a function of structure depth, structure length and the number of piers within the waterway. For this particular bridge, there are two documents that provide guidance for the design of railroad structures: the *American Railway Engineering and Maintenance-of-Way Association (AREMA)*, which is a guideline for the railroad industry; and the *BNSF Guidelines for Railroad Separation Projects*, which gives specific requirements for designing bridges on the BNSF system. BNSF's design guide supersedes any differences in recommendations with AREMA's manual.

TKDA had preliminary discussions regarding the proposed bridge with BNSF Railway staff to determine their design requirements and possible flexibility in applying these design guidelines. This discussion resulted in two comments that impact the design:

- Windows for interrupting railroad traffic will be limited to a maximum of six hours
- 20-foot tracks centers are required at the bridge.

There are multiple superstructure types that would work for the proposed bridge. Steel is an option but is more expensive to construct than concrete, and due to the saltwater environment, steel would require more long-term maintenance than concrete. BNSF has multiple standard concrete structures that are feasible. Our evaluation of the crossing, taking into consideration horizontal and vertical clearances, cost, and speed of construction, resulted in our recommendation for the use of prestressed concrete superstructures.

Three bridge layouts were developed.

1. Three-span bridge with 30-foot main span. (Figure 1)
    - Main span: 30-inch double cell box beams.
        - The structure depth from top of tie to low chord: 45 inches.
    - First and last spans: 20-inch concrete slab beams.
        - The structure depth from top of tie to low chord: 35 inches.
2. Three-span bridge with 40-foot main span. (Figure 2)
    - Main span: 36-inch single cell box beams.
        - The structure depth from top of tie to low chord: 51 inches.
    - First and last spans: 20-inch concrete slab beams.
        - The structure depth from top of tie to low chord: 35 inches.
3. Four-span bridge with two 40-foot main spans. (Figure 3)
    - Main spans: 36-inch single cell box beams.
        - The structure depth from top of tie to low chord: 51 inches.
    - First and last spans: 20-inch concrete slab beams.
        - The structure depth from top of tie to low chord: 35 inches.

The prestressed concrete beams for each option were determined by evaluating allowable span lengths and minimizing structure depth. The span lengths of the main spans can be increased by 3 to 4 feet without increasing the structure depth if longer openings are desirable. The first and last spans cannot be increased using the proposed slab spans. If longer first and last spans are required, the structure depth would have to increase by 10 inches.

The superstructure will consist of two to four main longitudinal girders made up of precast concrete. Each span will have two to four major components to be placed to complete the construction of the bridge.

The substructures are also precast concrete components and will be supported by H-pile. The H-pile will be driven prior to excavating and cut-off initially below top of tie and cutoff again during a window for constructing the substructures. When the precast caps are placed they will be lowered into position by a crane and then welded to the H-pile.

The proposed structure type is widely used and is acceptable for use on the BNSF system in Puget Sound.

2.6. Construction Options

Two options are available to construct the bridge. The first option would use a shoofly. (A shoofly temporarily relocates a track to allow for conventional and uninterrupted bridge construction.) In this specific application, the proximity of Puget Sound requires the shoofly to be located to the east of the existing track. The second option would not use a shoofly and would require construction during multiple 6-hour work windows. The cost estimate below assumes the use of a shoofly.

To facilitate the construction of the shoofly, the existing box culvert may have to be lengthened. The extent of the modifications to the culvert, if needed, is unknown and not included in the cost estimate.

Constructing a high speed shoofly along the landward side of the existing railroad embankment is challenging because of the adjacent steep bluffs. These bluffs would need to be excavated to construct the shoofly, and this would be both risky and cost prohibitive (see Geotechnical Evaluation, Appendix C). Construction of the shoofly on the water-ward side of the tracks would be very difficult to permit due to encroachment of the constructed berm below ordinary high water. A landward low speed shoofly may be feasible as the overall length of the low speed shoofly will be less than is required for a high speed shoofly. The reduced length of the low speed shoofly may be compatible with the existing bluff topography.

3. ESTIMATED BRIDGE CONSTRUCTION COSTS

The estimated bridge construction costs below utilize 2014 average bid prices. The costs for bridge construction for each concept include a 30% contingency, which is commensurate with the conceptual level of detail of this feasibility study and allows for comparison of proposed options. The conceptual costs for the project; including additional contingencies and assumptions are provide in Sections 4.4 (all Concepts) and Section 5.4.3 (preferred Concept, Option 3) of the main body text of the Feasibility Report. Costs for the preferred concept include additional contingencies and assumptions based on results of a preliminary constructability review for the work (described in Section 5.4.2 of the main body text of the Feasibility Report). Recommended next steps for the project include an on-site contractor review and contactor assistance in refining the cost estimate for the preferred alternative (see Section 4 below).

Meadowdale BNSF Railroad Bridge Cost Estimate			
	Option A (25', 30', 25' spans)	Option B (20', 40', 20' spans)	Option C (25', 40', 40', 25' spans)
Civil works	$1,921,455	$1,921,455	$1,921,455
Double track bridge	$1,260,000	$1,470,000	$2,170,000
Engineering (15%)	$475,000	$510,000	$615,000
Contingency (30%)	$1,100,000	$1,200,000	$1,450,000
Total Construction Estimate	$4,757,000	$5,102,000	$6,157,000

*Civil works assumes use of a high speed shoofly. Feasibility and cost of a low speed shoofly needs to be determined. Cost does not reflect the results of the constructability review. Constructability considerations and uncertainties are discussed in Section 5.4.2 of the main body of the Feasibility Report.

4. RECOMMENDATION

Due to the existing site conditions, the options for constructing the railroad bridge are limited. With the inability to move either track permanently to the west, only one location for the new permanent track alignment available.

Two possible options for constructing the bridge remain: the use of a low speed shoofly, or no shoofly. The cost of constructing the shoofly is high, but the available safe construction methods will considerably lower the risk and the time of constructing the bridge provided BNSF approves the use of a low-speed shoofly at the site and construction of the low-speed shoofly can be completed without impacts to the adjacent bluffs. Conceptual design and evaluation of the low-speed shoofly for the project site should be conducted as part of next steps for the project.

Not using a low-speed shoofly and building the bridge on active tracks during work windows is considerably more difficult for the west bridge than for the east bridge. When constructing the east bridge there is room east of the proposed Main 1 track for the construction crews to access the work area. Space for the placement of excavators and cranes in efficient locations is available. For the west bridge there is virtually no space available during high tide for construction crews to set-up equipment next to the track without a temporary widening of the embankment towards the Puget Sound or construction of a temporary work platform that allows the contractor to construct the west BNSF Bridge.

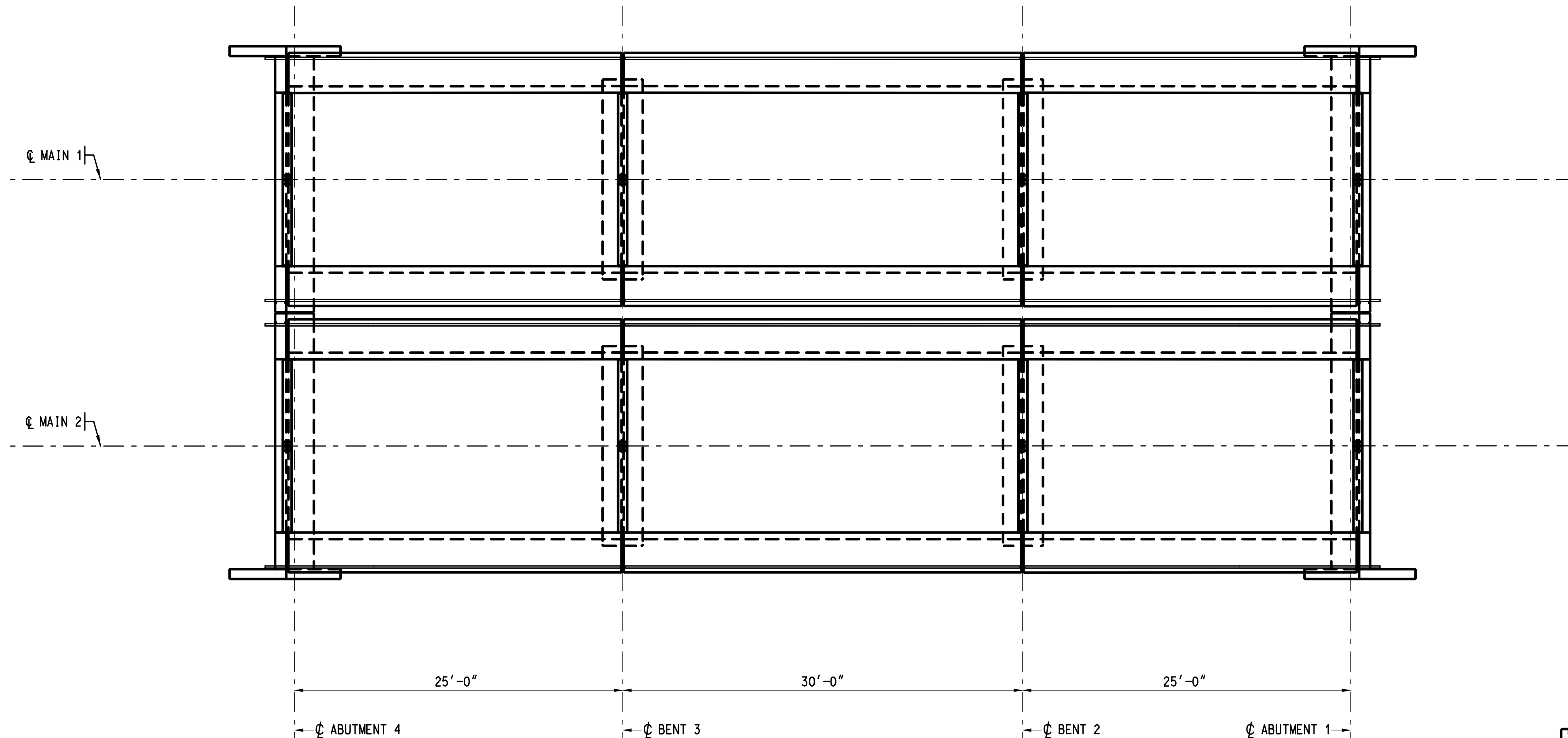
Despite the difficulties inherent in the construction of the bridges without a low-speed shoofly, this option is still worth pursuing as our preferred option with BNSF because of the cost aspect. If, after further evaluation, the low speed shoofly option yields considerable benefits for the project and those benefits outweigh the added costs of the shoofly, the preferred option should be reconsidered. However, the feasibility of a low speed shoofly and additional clarification on available construction work windows at the site from BNSF is important to inform a final recommendation. Development of a formal submittal for review by BNSF is recommended that includes a standard BNSF submittal cover letter, description of the project, figures showing the proposed design of BNSF-related project elements, proposed construction sequence, and required coordination with BNSF for design and construction (e.g., required construction work windows) in order to better understand available work windows at the project site.

In addition, there are constructability challenges at the site that will influence means and methods of construction and associated costs. A preliminary constructability review was conducted for the preferred alternative (Option 3) which is summarized in Section 5.4.2 in the main body text of the Feasibility Report. A follow-up constructability review, which would include time for a contractor to visit the site and assist with developing means and methods and costs for the preferred concept (Option 3) is recommended as a next step for the project.

APPENDIX

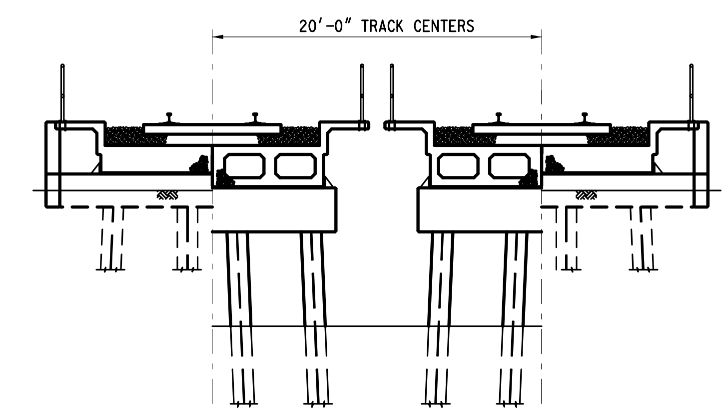
WEST TO SEATTLE, WA

EAST TO WENATCHEE, WA

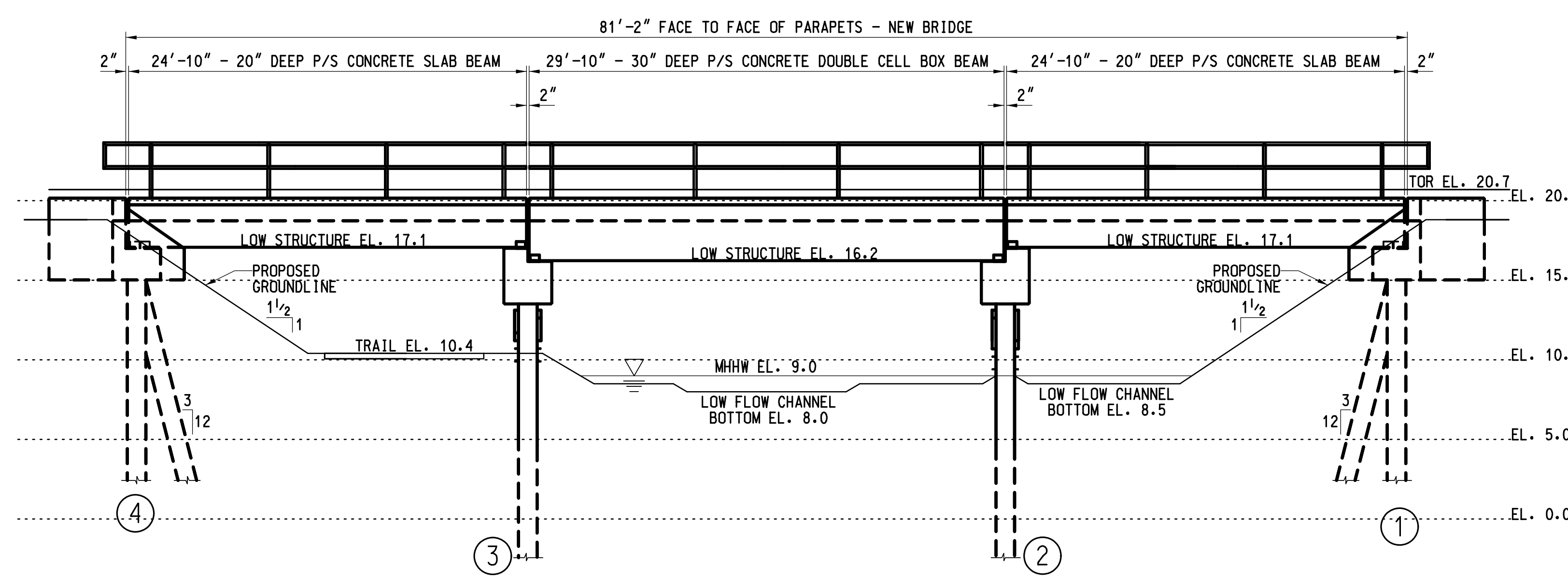


GENERAL PLAN

SCALE: 1/4"=1'-0"



TYPICAL SECTION



GENERAL ELEVATION

FIGURE 1

CONCEPT LEVEL
TYPE, SIZE AND LOCATION

FOR

SEATTLE, WA TO WENATCHEE, WA
SCENIC SUBDIVISION ,LS 50

BRIDGE NO. 21.30

OVER LUNDS GULCH CREEK
EDMONDS, WA

NO.	DATE	BY	DESCRIPTION OF REVISIONS

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES: MJC	DRW: MJC	CHK:
DATE: APRIL 2015	AFE NO.:	

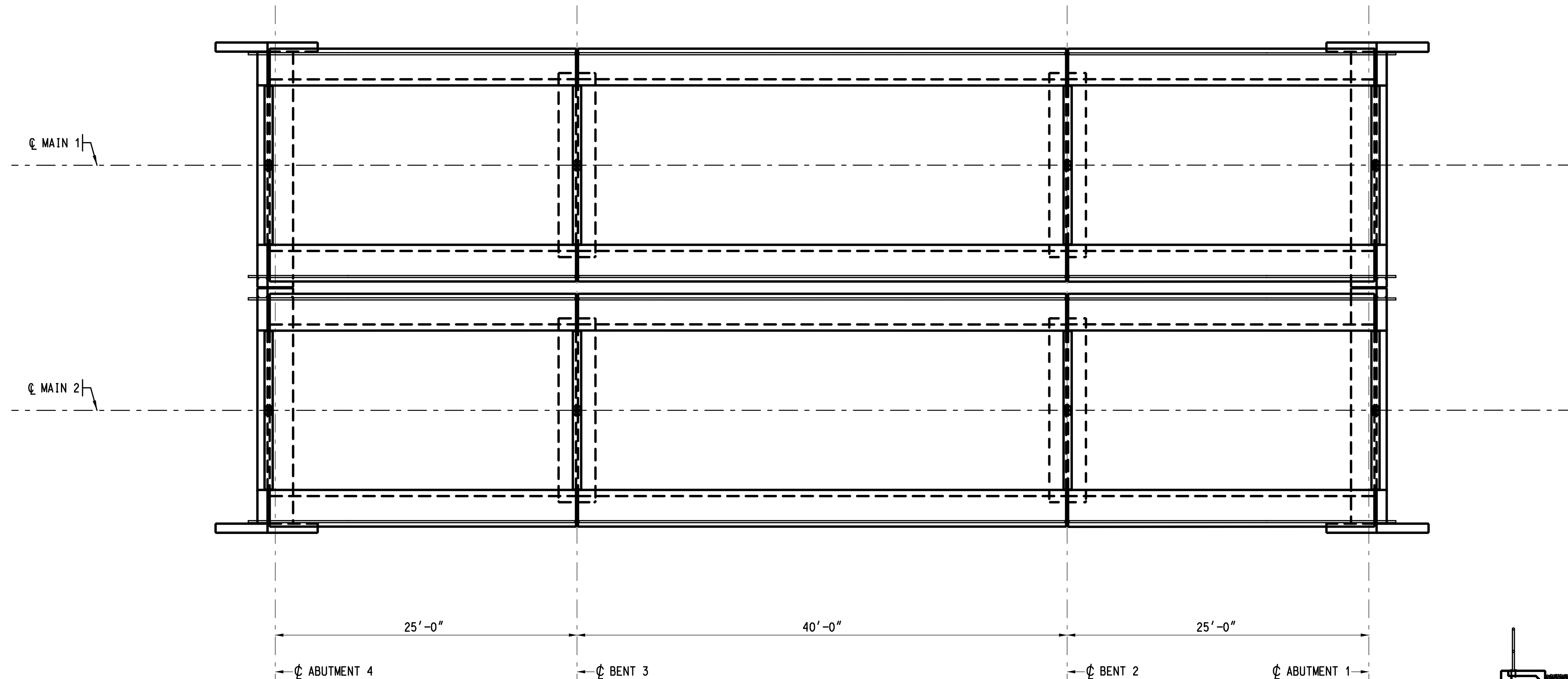
GENERAL PLAN & ELEVATION

COMM. NO. 15768.000

DRAWING NO. ALT

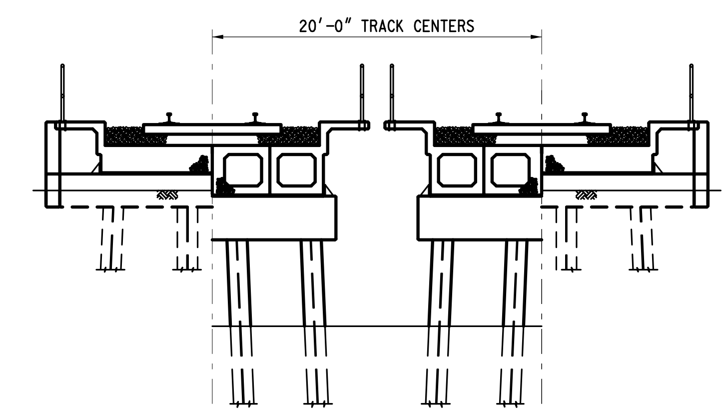
WEST TO SEATTLE, WA

EAST TO WENATCHEE, WA



GENERAL PLAN

SCALE: 1/4"=1'-0"



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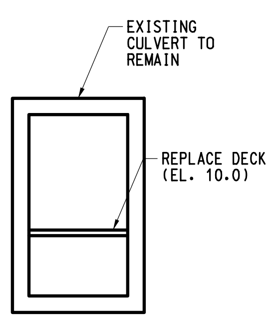

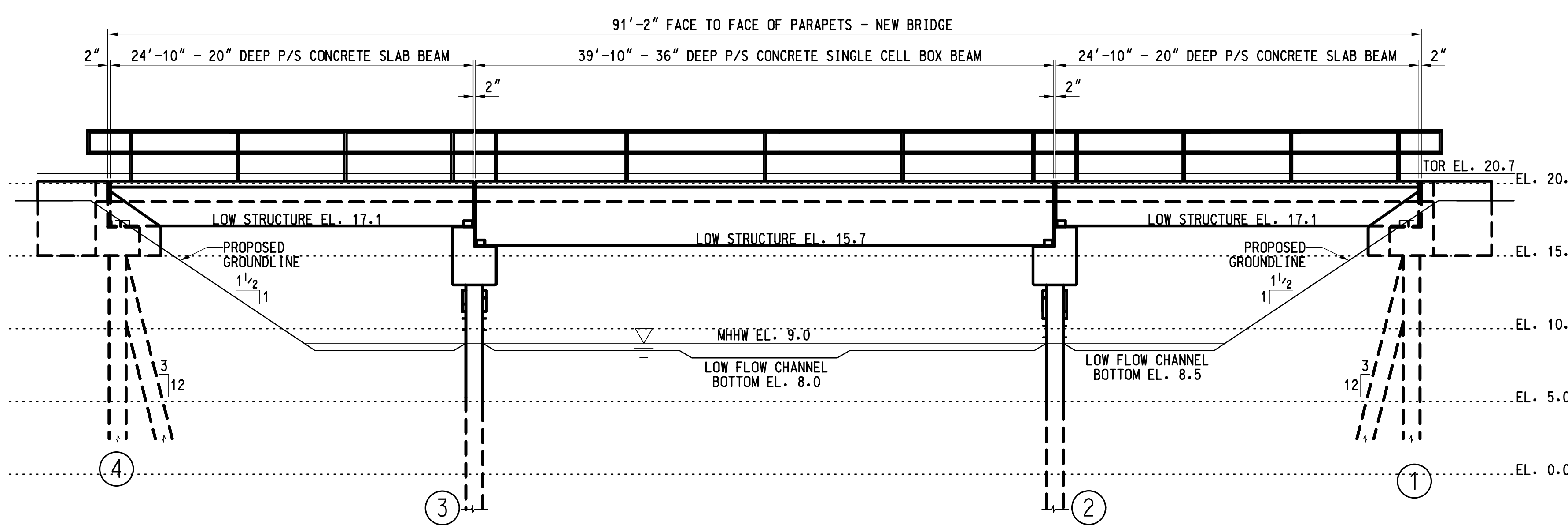

GENERAL ELEVATION

FIGURE 2

CONCEPT LEVEL
TYPE, SIZE AND LOCATION
FOR
SEATTLE, WA TO WENATCHEE, WA
SCENIC SUBDIVISION ,LS 50

BRIDGE NO. 21.30

OVER LUNDS GULCH CREEK
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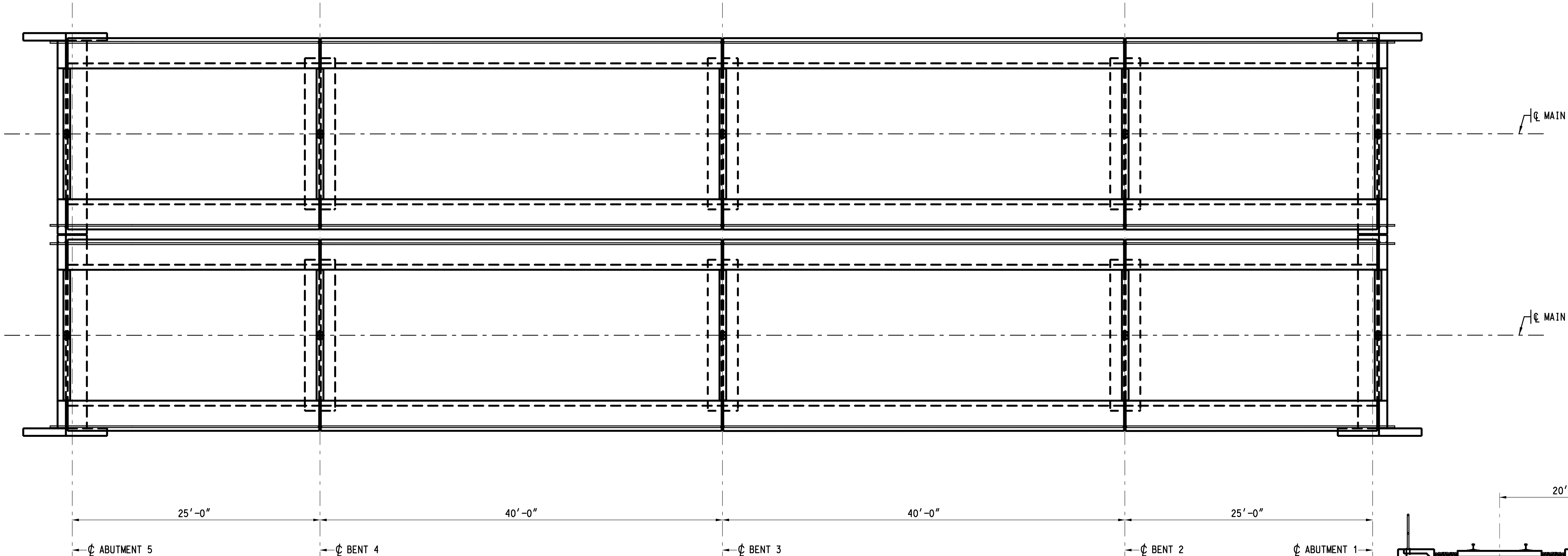
GENERAL PLAN & ELEVATION

COMM. NO. 15768.000

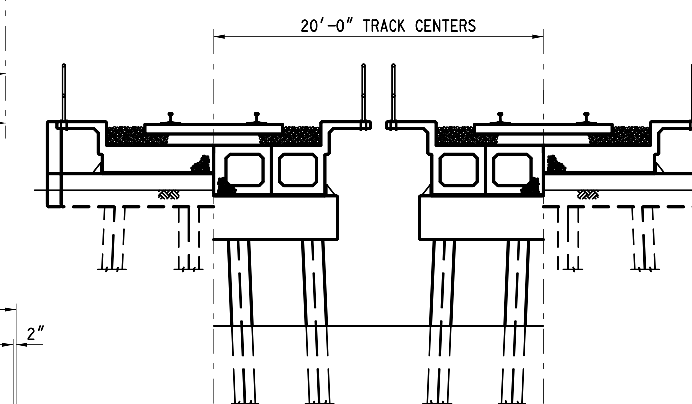
DRAWING NO. **ALT**

WEST TO SEATTLE, WA

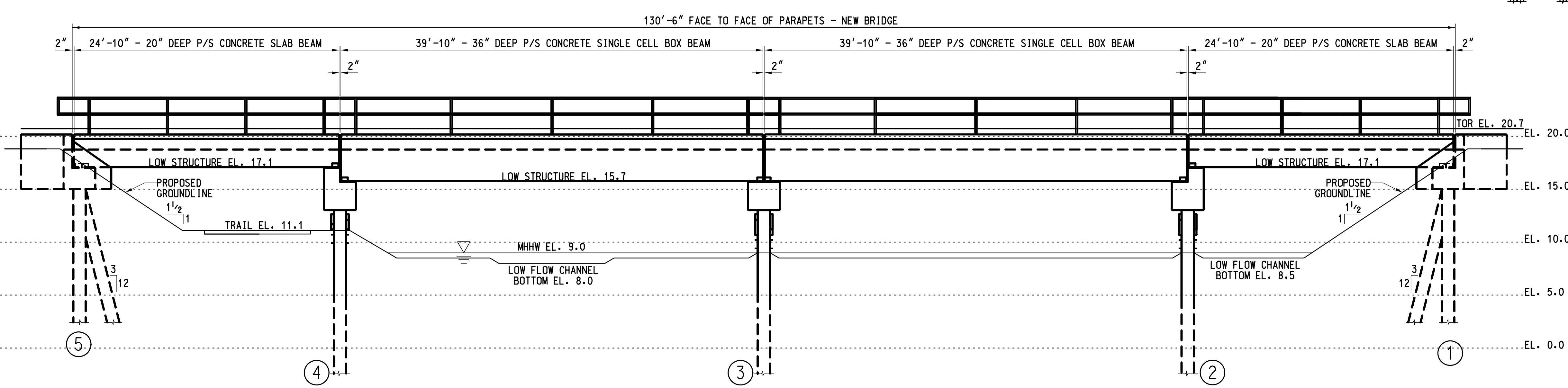
EAST TO WENATCHEE, WA



GENERAL PLAN
SCALE: 1/4"=1'-0"



TYPICAL SECTION



GENERAL ELEVATION

FIGURE 3

CONCEPT LEVEL
TYPE, SIZE AND LOCATION
FOR
SEATTLE, WA TO WENATCHEE, WA
SCENIC SUBDIVISION ,LS 50

BRIDGE NO. 21.30

OVER LUNDS GULCH CREEK
EDMONDS, WA

NO.	DATE	BY	DESCRIPTION OF REVISIONS

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

DES: MJC	DRW: MJC	CHK:
DATE: APRIL 2015	AFE NO.:	

GENERAL PLAN & ELEVATION

COMM. NO. 15768.000

DRAWING NO. PREFERRED ALTERNATIVE

APPENDIX G
CONCEPTUAL ALTERNATIVES DEVELOPMENT
SNOHOMISH COUNTY MEETING SUMMARIES

APPENDIX G-1
MEETING SUMMARY: CONCEPTUAL ALTERNATIVES MEETING DISCUSSION WITH SNOHOMISH COUNTY STAFF
1/15/2015

Meeting Summary:

Conceptual Alternatives Meeting Discussion with Snohomish County Staff

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Thursday, January 15, 2015, 2:00 pm to 4:00 pm

Attendees

Snohomish County Staff	**Consultant Team**
• Logan Daniels • Sharon Swan • Kathleen Herrmann (via conference call) • Tom Teigen • Doug Dailer, Park Ranger • Tom Murdoch • Frank Leonetti • Dave Lucas • James Yap	• Peter Hummel (Anchor QEA) • Kathy Ketteridge (Anchor QEA) • Paul Schlenger (Confluence) • Matthew Christensen (via conference call) (TKDA) • Matthew Gibson (via conference call) (Shannon and Wilson)

Meeting Purpose

Kathy provided an overview of the meeting purpose, which was to discuss potential opening sizes and locations, their constraints and benefits to project goals, and to decide on three concepts to move forward through in-depth analysis.

Brief Recap of Stakeholder Input Re: Evaluation Criteria

Peter, Kathy, and Logan provided a brief overview of feedback from the community and agency/organization stakeholder meetings that should be considered during the discussion of concepts. This feedback included a pedestrian overcrossing as a potential project element, and conversion of the lawn area to habitat from the sand volleyball court to the railroad berm.

Discussion of Proposed Concepts

The consultant team prepared seven concepts for discussion during the meeting, which are listed below. A summary of comments from the group are also provided after each listed concept.

Alternative 1: Minimal bridge opening to pass sediment at existing culvert. Includes passage for pedestrians to beach.

- This alternative would be the smallest opening that would meet fish and sediment passage criteria for the project and be in line with structural considerations for the railroad bridge.
- This alternative would represent the lower bound of alternatives considered in the alternatives evaluation.
- There was some concern from the group that looking at a "minimum" alternative was not in the best interests of restoration of the project site. However, it was decided that having information about the minimum/lowest costs alternative would be a beneficial addition to the alternatives analysis.
- The minimum bridge opening that could be considered from the perspective of the BNSF standard designs include the following:
  - Three-span concrete bridge; where the middle span is a clear span of between 20 and 40 feet (approximately) and the left and right spans would be used to construct the armor slope abutments required for the design (1.5H:1V typical side slope). Pedestrian access could potentially be placed within one of the "abutment" spans.
  - Vertical clearance between the lowest structural member and the bottom of any proposed pedestrian walkway would be dependent on span length. Spans around 20 feet would require approximately 4 feet from the top of rail to the bottom of lowest structural member for the bridge. Spans around 40 feet would require approximately 6 feet from top of rail to lowest structural member. This is an important consideration in choosing span length in order to maximize head room for pedestrians.
  - Older trestles, armor rock, or other debris could exist within the railroad berm and would likely cause issues with constructability for the bridge. But it would be the approximately the same risk for all proposed alternatives. Cost impacts would be proportional to the length of railroad berm disturbed by construction processes.

Alternative 2: Larger bridge opening (larger than Alternative 1) to provide more room for creek meander and additional room for pedestrian pathway.

- The costs for increasing the length of the bridge span from 20-feet wide up to a 40-foot-wide opening do not increase linearly. Therefore, there may be benefit to providing a larger span than the minimum suggested in Alternative 1 in terms of costs/benefits for the project.
- Additional clear spans could be added to the minimum three-span bridge to increase the size of the opening; however adding spans can significantly increase costs for the structure. In addition, BNSF approval may be more difficult to obtain beyond the standard three-span bridge.

Alternative 3: Use existing culvert for pedestrians. Additional minimum bridge opening for creek, creek re-aligned.

- There was some concern from the group about containing the creek in a new location to the north; that it would tend to migrate back to its original location especially during high flood events.
- There was some concern regarding the permitting challenges to moving the stream and whether this was necessary.
- There is a concern on the existing slope with the channel re-aligning north because of the stability of the slope and the potential of the stream scouring the toe, thus further destabilizing it. Further geotechnical investigation is necessary.
- There was some concern from the group about keeping flood water and high tides out of the existing tunnel, even if the creek is re-routed.
- The Park property boundary is about 100 feet north of the existing tunnel, and there is only room within the existing park boundary to build a relatively small bridge (see Alternative 1) for the new re-routed creek outlet.
- Due to challenges of building box culverts within allowable BNSF work windows (see comments on Alternatives 4 and 5), this may be one of the only viable options to significantly separate the pedestrian access from the creek (without using an overpass).
- There was some feedback from both the community and agency/organization stakeholders that separating the creek physically from the pedestrian access could be a benefit in terms of separating potential flood waters from the pedestrian access corridor.

Alternative 4: Use culvert for pedestrians. Additional larger bridge opening for creek, creek re-aligned.

- Building box culverts through the railroad prism at this location would require more time than the 6-hour shutdown period/work window currently allowed by BNSF at this location along the line. It is possible to request a longer work window, but it is challenging and costly.

Alternative 5: One additional box culvert for the creek/sediment. Additional box culvert for pedestrians only.

- Same concern for building box culverts at this location as Alternative 4.
- It would likely be more cost effective to construct a single bridge (three-span) than two separate box culverts, and may provide a larger clear opening than the two box culverts combined together.

Alternative 6: Full restoration, bridge across entire park area including areas for pedestrian access to beach.

- This alternative would require an approximately 400-foot bridge to span the entire park area fronting the Sound.
- This alternative would be very costly. It would also be difficult to get approval from BNSF for such a long bridge, especially if a smaller bridge could meet most of the project objectives. BNSF will have long-term maintenance concerns for any alternative other than the three-span minimum.
- This alternative would allow for greater opportunity for habitant enhancement and estuary creation but would require conversion of a significant portion of the lawn area.
- Deep foundations would likely be required to support the bridge and would be difficult to construct with short work windows.

Alternative 7: Minimal bridge/box culvert opening at existing culvert. Pedestrian overpass:

- The overpass would be required to follow ADA guidelines, which would require ramps (with a mild slope) or other means of access that meet stated ADA guidelines. Many existing overpass structures were constructed before ADA requirements were put into place.
- The structure would need to span the 100-foot (approximate) railroad right-of-way (clear span) and would need to be approximately 22 feet above the rail elevation to meet design requirements for the structure.

- Combination of ADA slope requirements and railroad vertical clearance requirements would result in a large structure that would be land intensive and costly to construct.

- The structure (due to its potential height) would not be a convenient access point for pedestrians, including those with disabilities. Access for an overpass would need to be located a significant distance upland to account for the rise in elevation to meet ADA slope requirements. This access point may be inconvenient for pedestrians who might choose to continue using the flooded tunnel and or go up and over the tracks.

- The structure would need to be built in such a way that the exit onto the beach remains above the high tide elevation which would require use of some of the more highly coveted beach area currently used by park patrons.

- Locating the foundation for the overpass upland on the steep slopes would likely require extensive stabilization to mitigate for historical slope instability.

Summarize Discussion and Choose Three Concepts:

- The group discussed the benefits of including a minimum alternative (Alternative 1) in the evaluation, specifically the importance of including the lower bound alternative for a cost benefit comparison to other alternatives and to ensure we have evaluated a reasonable spectrum of viable options

- The group discussed the benefit of looking at the full restoration (Alternative 6; 400-foot-wide bridge) versus a larger four-span bridge. The group decided that the four-span bridge would be an appropriate upper bound for the alternatives evaluation due to the potential cost, construction difficulty, and the likelihood that the full restoration option would not be supported by the Railroad. However, reference sites for similar locations will be used to determine the total clear span opening that should be considered for this site.

- The pedestrian overpass was discussed at length, and the group determined that it would not be evaluated as one of the three concepts moving forward. The structure would not address sediment load issues currently impacting the existing culvert and therefore would not address the maintenance and flooding concerns. In addition, pedestrian safety issues would not be addressed as the access point for an overpass would most likely be located far upland in order to meet ADA slope requirements so from a convenience standpoint pedestrians may be inclined to use the flooded tunnel or cross the tracks. Locating the foundation on the upland slopes is problematic with the history of slides in this area; and finally the structure would be very land intensive.

- Three concepts (in terms of opening locations and approximate sizes) were outlined to move forward into the evaluation phase of the project:

- Minimum opening three-span bridge at current location with pedestrian access within bridge abutment span (Proposed Alternative 1)

- Leave culvert at current location for pedestrian access and add new three-span bridge to north; relocating Lund's Gulch Creek (Proposed Alternative 3)

- Maximum opening four-span bridge at current location with pedestrian access within bridge abutment span (Proposed Modified Alternative 2)

Next Steps (Logan and Kathy)

- The consultant team will move forward with the hydraulic modeling and preliminary habitat evaluation in order to narrow in on the minimum required bridge opening (clear span) to provide adequate sediment and fish passage.

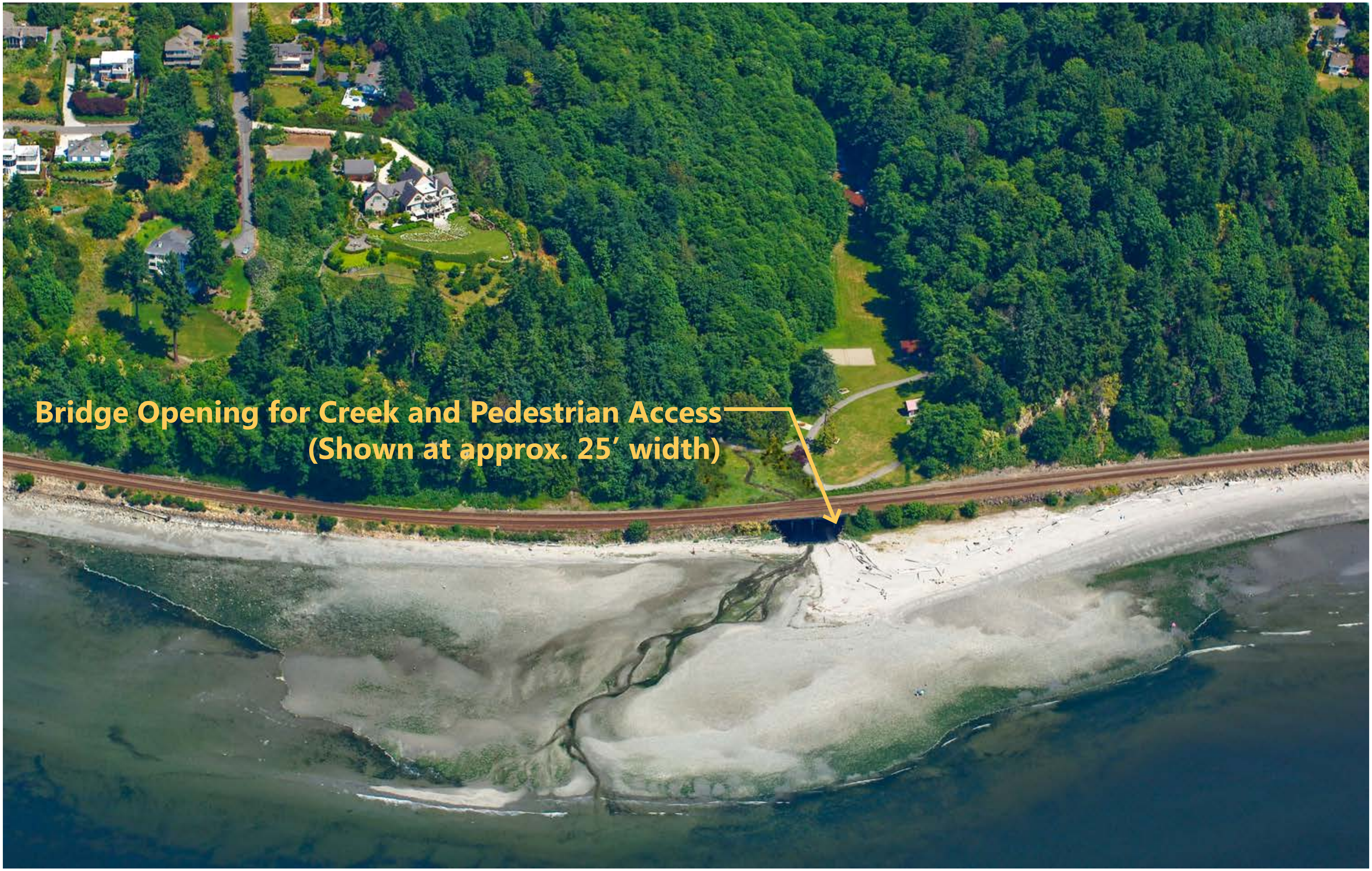
- The consultant team will move forward with developing conceptual drawings (plan views and "bubble diagrams") of the three concepts for the County's review.

- A second County/Consultant meeting will be scheduled in mid-February to further discuss the three concepts, specifically in terms of habitat and park/recreation options, since this first meeting was primarily focused on gaining an understanding of the constructability and operation constraints regarding work within railroad right of way.

Attachments: Meeting Exhibits

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on January 15, 2015.
Renderings were provided for the meeting to illustrate concepts that are works in progress and were for discussion purposes only.



Alternatives 1 and 2

Renderings were provided for the meeting to illustrate conceptual railroad openings only; and do not include associated nearshore, habitat or park element modifications.

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Alternatives 3 and 4

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Alternative 5

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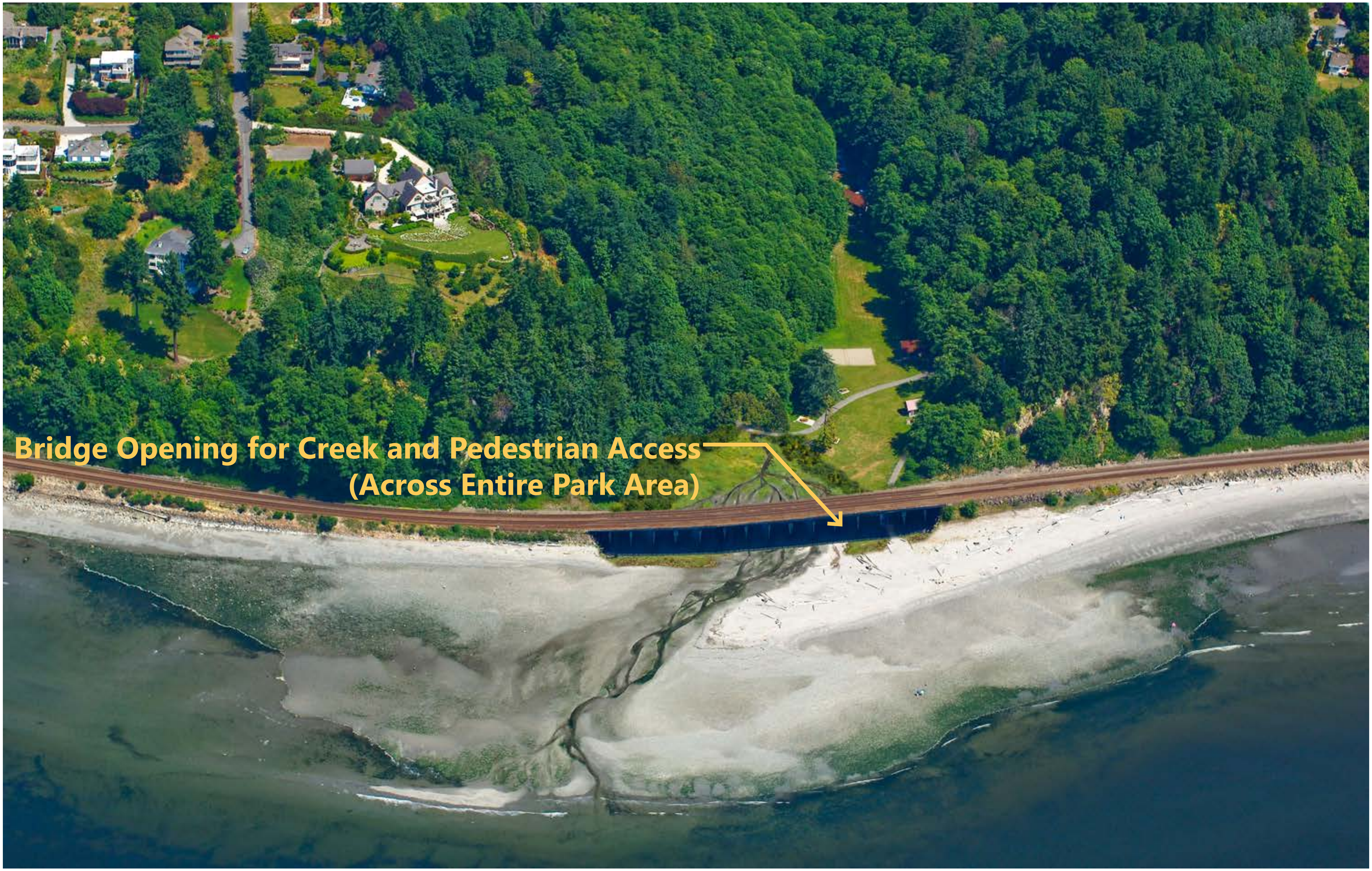

Alternative 6

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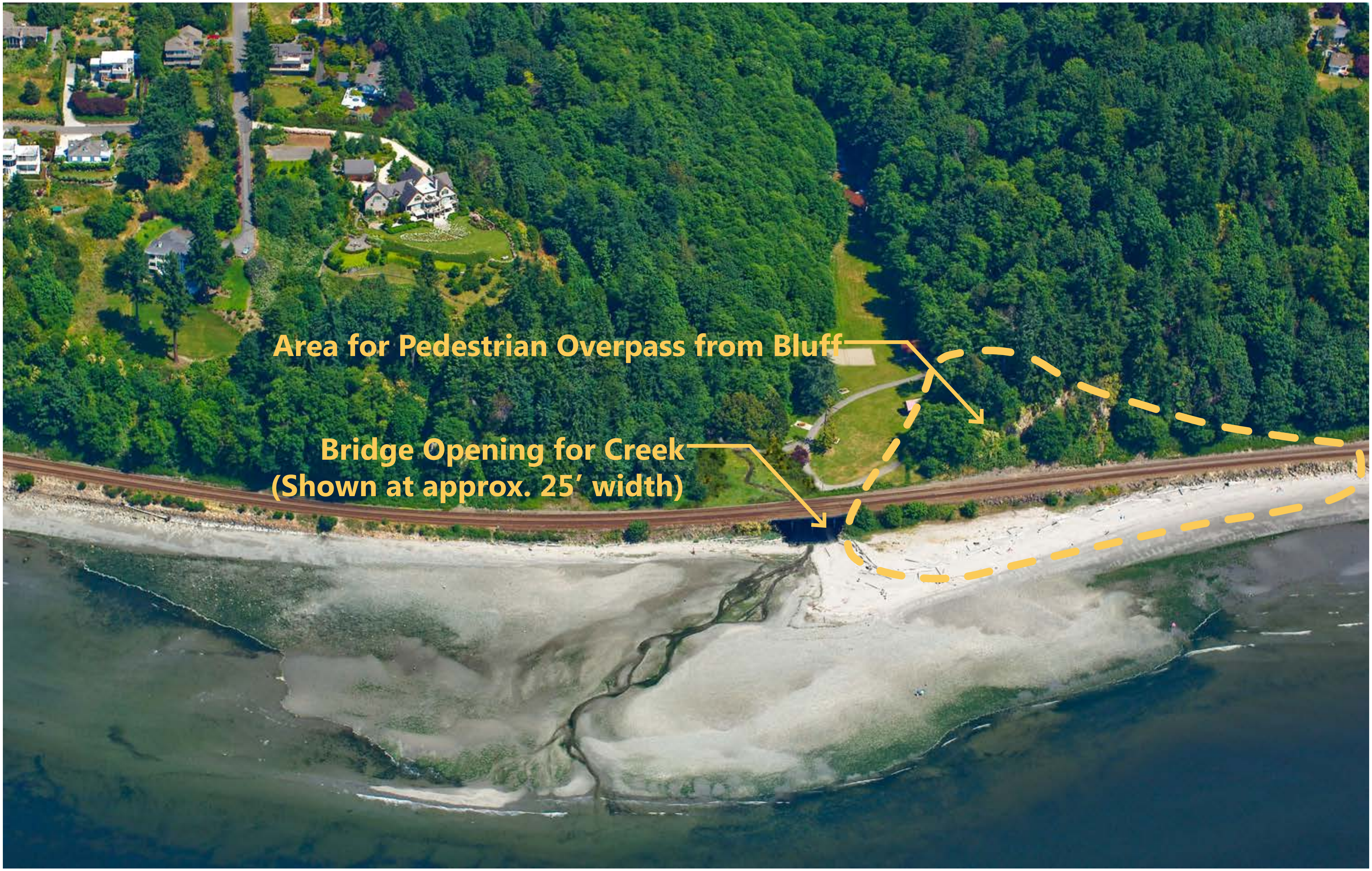
Renderings were provided for the meeting to illustrate concepts that are works in progress and were for discussion purposes only.



Alternative 7

Renderings were provided for the meeting to illustrate conceptual railroad openings only; and do not include associated nearshore, habitat or park element modifications.

APPENDIX G-2
MEETING SUMMARY: CONCEPTUAL ALTERNATIVES MEETING #2 DISCUSSION WITH SNOHOMISH COUNTY STAFF
2/26/2015

Meeting Summary:

Conceptual Alternatives Meeting #2 - Discussion with Snohomish County Staff

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Thursday, February 26, 2015, 8:30 am to 10:30 am

Attendees

Snohomish County Staff	**Consultant Team**
• Logan Daniels • Sharon Swan • Kathleen Herrmann • Tom Teigen • Doug Dailer, Park Ranger • Frank Leonetti • Dave Lucas • James Yap • Russ Bosanko	• Peter Hummel (Anchor QEA) • Kathy Ketteridge (Anchor QEA) • Paul Schlenger (Confluence)

Meeting Purpose

Kathy provided an overview of the meeting purpose, which was to discuss the three proposed alternatives in terms of recreational/ADA access and habitat restoration opportunities. The size and type of potential openings through the BNSF railroad berm were discussed during a previous meeting with the County on January 15, 2015.

Brief Overview of Preliminary Hydraulic Modeling

Kathy provided a brief overview of results of preliminary hydraulic modeling conducted by Anchor QEA to evaluate the opening width (through the railroad berm) required to allow unimpeded transport of sediment at high flows. Sediment loads were estimated by Shannon and Wilson as part of the geotechnical studies included in the project scope of work. Hydrology was taken from the County's 2002 Puget Sound Tributaries Drainage Report, which suggests a 100-year flow of approximately 130 to 150 cfs at the mouth of the creek, which matches hydrology within the Hec-Ras model of the creek provided to Anchor QEA by the County. Photos of the site show flooding that implies the flow during those events was higher than 150 cfs; therefore, additional modeling was done at 200, 300, and 400 cfs as part of a sensitivity study. Due to uncertainties in predicted hydrology and groundwater input to the system, and photographic evidence of severe flooding not explained by a 150 cfs flow, a flow of 300 cfs was used to size the minimum bridge opening.[1] The results of the preliminary modeling illustrate that an opening of at least 20 feet is required to pass sediment through the opening during a 300 cfs flow.

Discussion of "Minimum Opening"

Logan led a discussion with the group to determine what should be used as the smallest opening size through the railroad berm for the range of proposed alternatives. The group decided that 30 feet should be the minimum clear span used for the proposed alternatives. This is slightly larger than the 20-foot minimum opening size determined from preliminary hydraulic modeling. This additional width is provided to account for potential future increases in sediment load into the system and sea level rise and to match the approximate bank-full width for the creek that exists upstream of the footbridge.

Description of Proposed Concepts

The consultant team prepared three concepts for discussion. Plan and section views were provided at the meeting to illustrate the concepts. The three concepts are described below:

- Alternative 1: A three-span bridge with a 25-foot clear span and two 25-foot abutment spans. Creek outlet provided through the clear span and the north abutment span. Pedestrian access provided in the south abutment span (10-foot walkway width). The walkway height would be optimized to provide up to 7 feet of vertical clearance but would be inundated during higher tides.
- Alternative 2: Retain the existing tunnel for pedestrian access and build a three-span bridge to the north of the tunnel location for the creek outlet. The bridge is the same size as for Alternative 1 above. The existing tunnel bottom would be modified to optimize the vertical clearance[2], but would be inundated during higher tides.
- Alternative 3: A four-span bridge with two 40-foot clear spans and two 25-foot abutment spans. Creek outlet provided through the clear span and the north abutment span. Pedestrian access provided in the south abutment span (10-foot walkway width). The walkway height would be optimized to provide up to 6 feet of vertical clearance to maximize the amount of time the walkway would not be inundated by creek flows. The walkway in this alternative would be inundated during extreme high tides only.

Discussion of Proposed Concepts

The group discussed each of the concepts and provided input on the concepts, comments on the plan/section view figures, and suggestions for modifications to the draft concepts. Key comments from the discussion included the following:

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[1] *Not discussed at the meeting*: Previous hydrology developed in 1989 by the County (Lund's Gulch Basin Report) prior to construction of the 152nd Street retention pond estimated hydrology at the mouth of the creek to be almost double what predicted in the 2002 report. The 100-year flow was estimated as approximately 300 cfs at the mouth of Lund's Gulch Creek in the 1989 report.

[2] *Not discussed at the meeting*: The existing culvert geometry is provided in Table B-1 of the 2002 County Drainage Report. Invert elevation of walkway upstream is 11 feet NAVD88 and downstream is 9.6 feet NAVD88. Invert elevations of the bottom of the culvert are 9.5 feet and 8.1 feet NAVD88, respectively.

- Vertical clearance and the elevation of the walkway for pedestrian access need to be precisely defined. It is important to understand how often the walkway (percent of the year) would be inundated by the tide at different elevations relative to allowed vertical clearance.
- The possibility of adding an additional pedestrian access walkway through the northern abutment span was discussed. However, there was concern that this trail extension would segregate habitat areas in that portion of the site; therefore, it was not carried forward.
- The proposed new pedestrian footbridge upland of the embankment needs to be adequately sized (both in width and height) to accommodate flows and sediment transport capacity similar to the new bridge through the railroad berm. We anticipate that the total width of the new pedestrian bridge will be approximately 40 feet.
- The wetland area to the north of the site adjacent to the railroad berm should be re-connected to the creek; currently, it is separated from the main channel of the creek by the existing pathway.
- There will be a transition area from beach substrate (gravels and sands) to vegetated wetland upstream of the new opening. The size of this transition area will be dependent on the sediment load in the creek and the size of the bridge opening. It will also be dynamic; as sediment is transported through the system cyclically due to high flow events.
- Sediment transported through the creek and out onto the beach will have some retention time at the mouth of the creek within the new outlet. The retention time will depend on the frequency and magnitude of high flow events in the creek. This is a natural process and will have some unpredictability associated with it. However, it is a goal of this project to create an opening that can transport the predicted sediment load out onto the beach
- The creek upstream of the existing foot bridge appears to have a relatively natural alignment. The creek downstream of the footbridge is constrained by several rock and wooden control structures, some of which are not functioning well. The creek below the footbridge should be re-aligned as part of construction of the project to more natural configuration in the proposed alternatives.
- The habitat and recreational features shown for the three alternatives could be "mixed and matched" with a different opening size/type through the railroad berm. However, the larger habitat area shown for Alternative 3, which has the largest bridge opening, would likely be needed to accommodate the larger bridge opening and subsequent larger migration zone for the creek through the opening.
- While Alternative 2 is merited as a conceptual alternative because it provides additional separation between the creek and pedestrian access, the existing tunnel may be problematic for several reasons including height restrictions, potential migration of the relocated creek back towards the opening, and potentially experiencing inundation from the same tides as the other openings.
- "Dead-end" picnic areas shown on several of the alternatives at the terminus of the northern trail would provide benefit to large groups visiting the park, such as educational programs, by providing a place to congregate off the main trail. There

is some concern that these terminus areas could provide a safety concern for the public. Therefore, they were removed from Alternative 2 but were left in Alternatives 1 and 3 for consideration and evaluation as part of the Recreation and ADA Needs study.

- The existing volleyball court is not heavily used by park visitors.
- Views of the water from areas in the park east of the railroad berm may be hindered somewhat by the lower beams supporting the new bridge.
- Vertical clearance requirements for ADA access based on local and/or federal regulations may not be met for some alternatives in order to maximize the vertical height of the pathway to keep it out of the creek flows.
- Plan views should highlight all of the lawn area available for each alternative, even if no modifications to those lawn areas are proposed. Plan views should also show the park boundary.

Next Steps

- The consultant team will revise plan and section views of proposed alternatives based on results of this meeting and will submit revised plan/section views for the three proposed alternatives to the County. Revised concept figures are provided in Attachment 1 to this meeting summary.
- The consultant team will move forward with all of the studies as outlined in the scope of work (Task 5) to evaluate feasibility of the three revised concepts.
- The consultant team will move forward with collecting survey data on site as required to fill data gaps (e.g., height of the rail, geometry of the existing tunnel, channel thalweg elevations, etc.).

Attachments: Revised Plan and Section Views for Conceptual Alternatives

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

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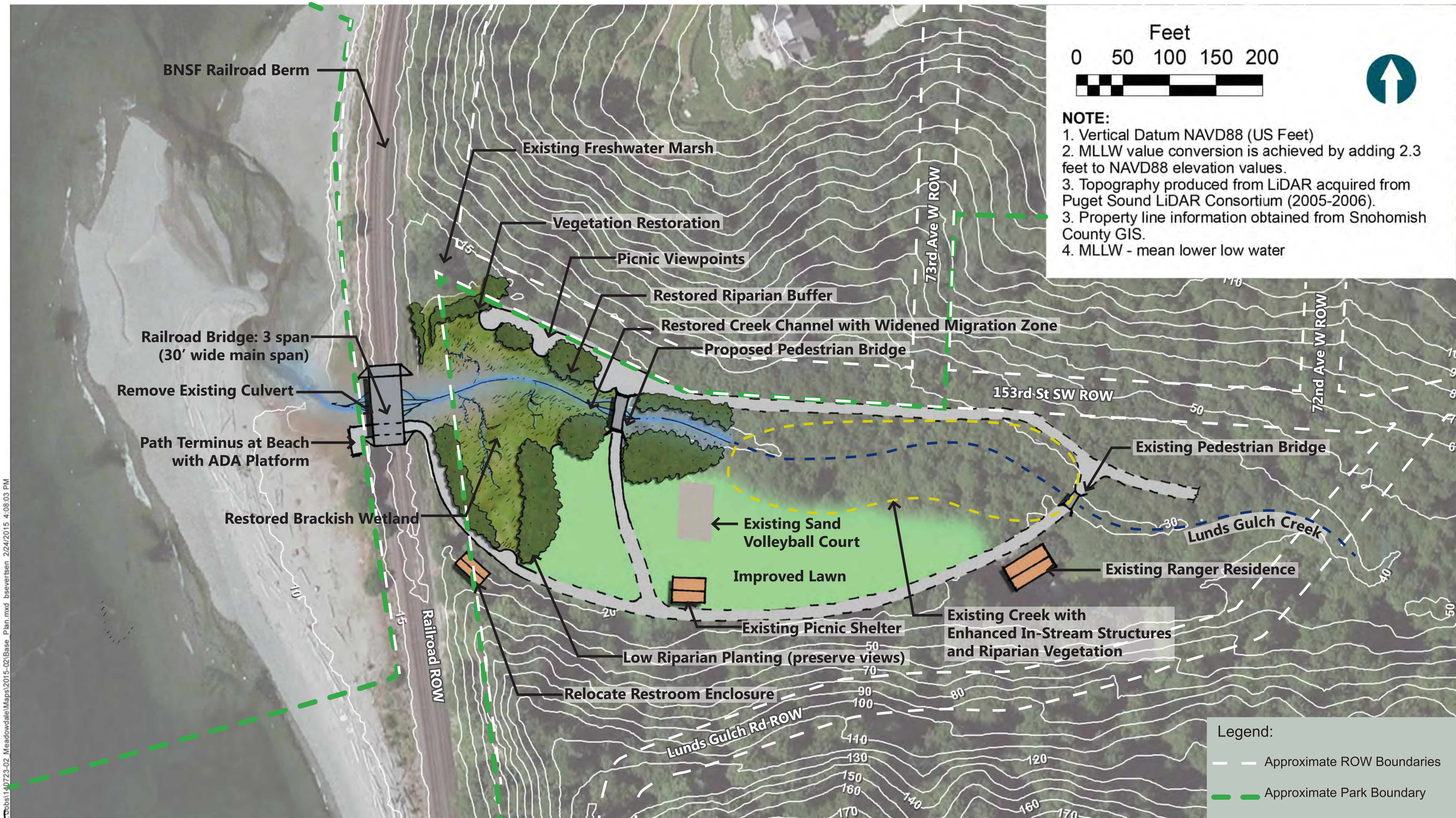
Revised on 3/9/2015 based on County feedback.



Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat

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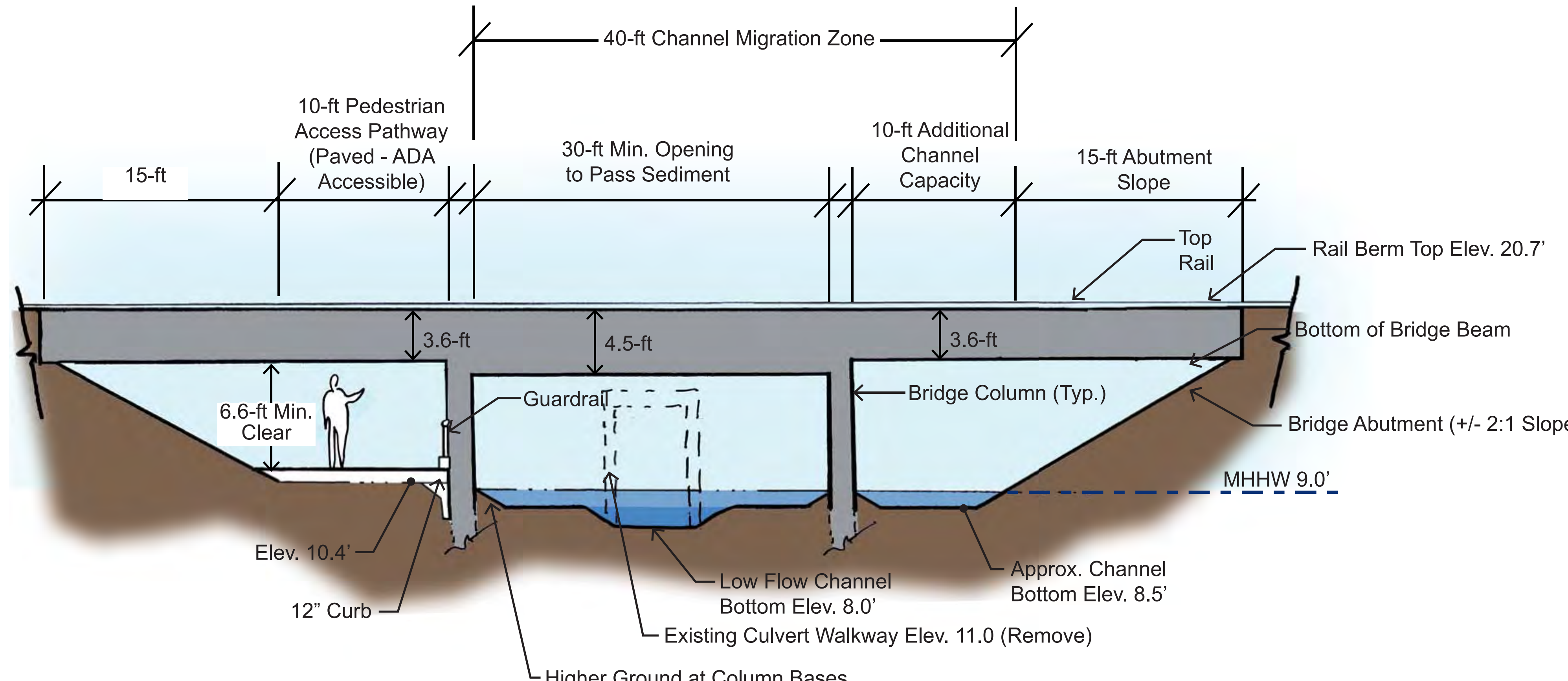

Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat

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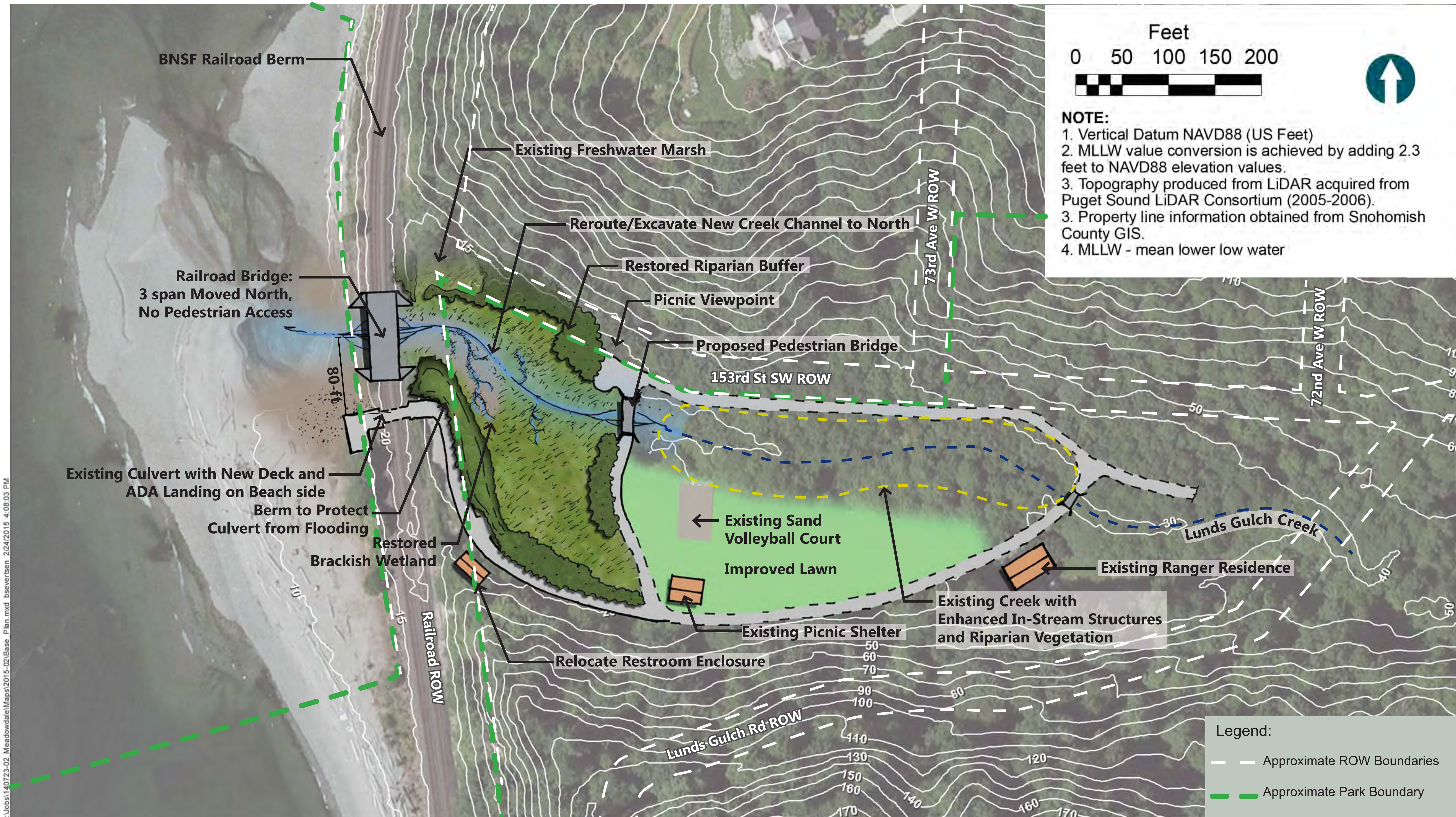
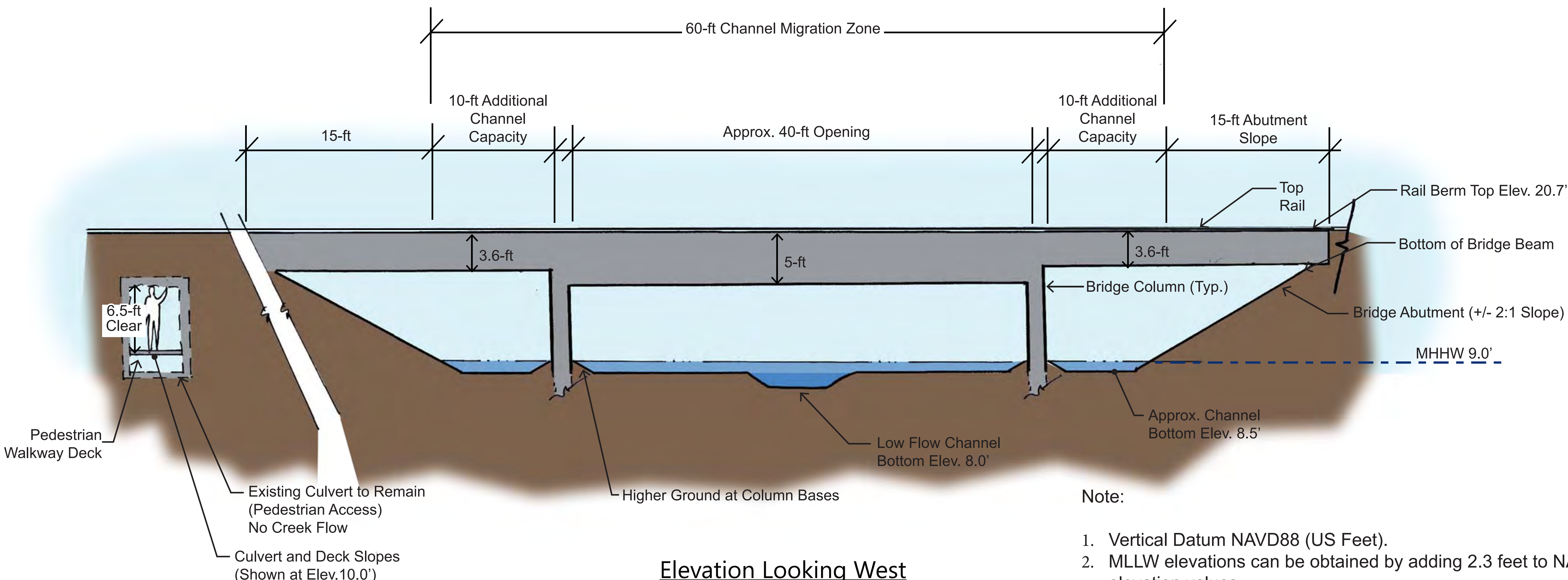


Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat



Elevation Looking West

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Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat

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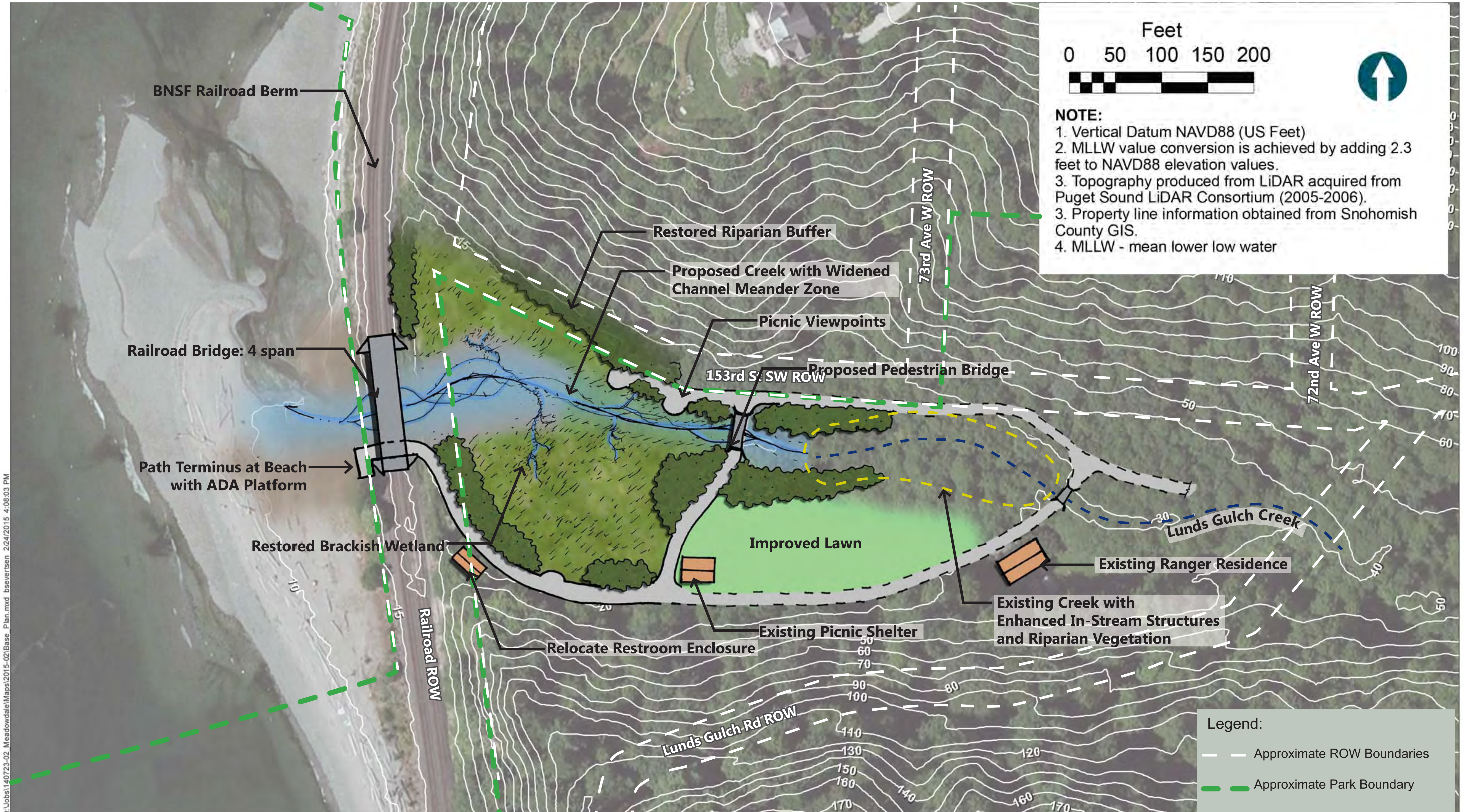

Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

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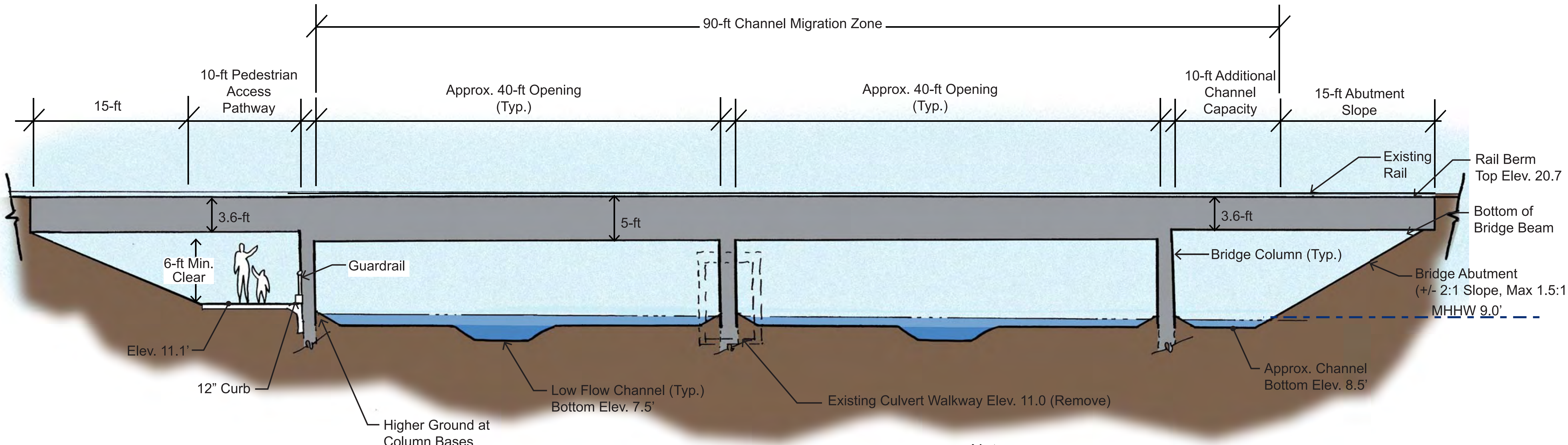

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5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Elevation Looking West

Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat

APPENDIX H
COASTAL ANALYSIS MEMORANDUM

1605 Cornwall Avenue
Bellingham, Washington 98225
Phone 360.733.4311
www.anchorqea.com

MEMORANDUM

To:	Logan Daniels, Snohomish County Parks and Recreation	**Date:**	August 26, 2015
From:	Kathy Ketteridge, and Alyssa Cannon, Anchor QEA, LLC	**Project:**	140723-02.01
Cc:	Peter Hummel, Anchor QEA, LLC		
Re:	Meadowdale Beach County Park Feasibility Study – Coastal Analysis		

PURPOSE OF EVALUATION

An analysis of physical and geological coastal processes of the Lund's Gulch Creek delta was conducted for the project site to evaluate typical and extreme wave climate, potential net littoral drift rates, and general geomorphic behavior of the delta based on historical information. Based on this understanding of existing coastal processes at the site, impacts to coastal processes due to proposed alternatives for the creek opening through the railroad berm were evaluated. This evaluation included discussion of sustainability of physical and geologic coastal processes at the site based on potential future climate change (increased flow in the creek and sea level rise).

COASTAL SETTING

The nearshore area (waterward of the railroad berm) of Meadowdale Beach County Park (Park) is a creek-delta beach and is shaped by both flows from Lund's Gulch Creek and waves from Puget Sound. The current location of the creek outlet and delta location have not changed significantly since the late 1800s, based on review of the T-sheet for the project site (see Figure 1). The primary source of sediment to the delta both historically and currently is erosion within Lund's Gulch and Lund's Gulch Creek that is transported to the beach during higher flows in the creek. Lund's Gulch Creek is a relatively steep creek system flanked by steep bluffs that contribute sediment to the creek due to landslides and creek bank erosion. Figure 2 shows the current topography for Lund's Gulch, the railroad berm, and the nearshore area of the Park. The slope of the creek, based on these LiDAR data, is uniform throughout the gulch and is about 2.5%.

Historically, the delta was flanked to the north and south by coastal bluffs, which would have provided some additional sediment source to the shoreline due to bluff erosion (caused by storm waves or upland runoff). However, bathymetry data available offshore of the site (Finlayson et al. 2000) show that the delta extends out into deeper water down to water depths of approximately -10 feet North American Vertical Datum of 1988 (NAVD88; see Figure 3). This implies that the primary sediment source to the nearshore area along this reach was historically from Lund's Gulch Creek.

Net littoral drift is to the north at this location, and sediment from the southern bluff areas would have likely been a significant source of sediment to the delta historically. At the present time, these bluffs are separated from the nearshore area by the BNSF railroad and no longer supply any significant sources of sediment directly to the nearshore area. Currently, Lund's Gulch Creek is the only measureable source of sediment to the delta. The mouth of the creek is constrained by the existing box culvert/tunnel, which inhibits free movement of sediment from the creek watershed out onto the delta and beach. There is no discernable source of finer sediment down-drift (to the south) of the delta; drainages to the south consist of culverts through the railroad prism with no free flowing or daylighted creek systems within the drift cell for the site (to the south). Sediment loads from Lund's Gulch Creek were estimated by Shannon & Wilson as part of this project (see Geotechnical Evaluation). The loads were estimated to be approximately 80 cubic yards per year (on average) due to discrete landslide events and streamside erosion. However, it was also estimated that three significant storm events delivered approximately 400 cubic yards to the system during each storm (on average). Therefore, sediment input to the system is episodic in nature.

The delta shoreline faces to the west and can be impacted by wind-generated waves from the south, southwest, west, northwest, and north. The largest fetch distance is from the northwest; however, winds are predominately from the southwest in the region (see discussion of Wave Climate below). Therefore, the net littoral drift is to the north. The net littoral drift direction is also documented as northerly based on Washington State Department of Ecology drift cell mapping (Ecology 1991).

WATER LEVELS

The tidal range at the site is approximately 11.5 feet (on average), with extreme high tides reaching up to 3 feet higher than mean higher high water (MHHW). Tidal elevations for the site were taken from the National Oceanic and Atmospheric Administration (NOAA) tide station at Everett, Washington (No. 9447659), and are provided in Table 1.

Sea level rise estimates were taken from the National Research Council (NRC) Report published in 2012 that documents sea level rise estimates for the west coast of the United States. Mid-range sea level rise estimates for 2030 (0.2 foot), 2050 (0.6 foot), and 2100 (2.0 feet) were also considered in the analysis to evaluate sustainability of coastal processes at the site. Potential tidal datums for the years of 2030, 2050, and 2100 based on these sea level rise estimates are also provided in Table 1.

Table 1
Existing and Future Tidal Datums at the Site Referenced to NAVD88 Datum

Datum	2015	2030	2050	2100
	Elevation (feet)			
Mean Higher High Water (MHHW)	9.0	9.3	9.7	11.1
Mean High Water (MHW)	8.1	8.4	8.8	10.2
Mean Tide Level (MTL)	4.4	4.7	5.1	6.5
Mean Sea Level (MSL)	4.4	4.6	5.0	6.4
Mean Low Water (MLW)	0.7	1.0	1.4	2.8
North American Vertical Datum of 1988 (NAVD88)[a]	0	0.2	0.6	2.0
Mean Lower Low Water (MLLW)	-2.0	-1.8	-1.4	0.0

Note:
a. Project site is located about half-way between tidal benchmarks in Seattle and Everett.

FLOWS IN LUND'S GULCH CREEK

Estimates of flows in Lund's Gulch Creek were taken from Puget Sound Tributaries Drainage Needs Report, developed by Snohomish County (County) in 2002. Based on that report, flows range from 57 cubic feet per second (cfs; 2-year flow) to 135 cfs (100-year flow). Previous hydrology developed by the County in 1989, prior to construction of stormwater retention works at 52nd Avenue, was higher (approximately 360 cfs for the 100-year flow). Hydrology is discussed in more detail in the Hydrology and Hydraulics Study.

WAVE CLIMATE

Storm waves for the site were estimated using wind-wave hindcast methods outlined in the U.S. Army Corps of Engineers Coastal Engineering Manual (USACE 2002). Hourly sustained wind speeds and directions from West Point and Seattle, Washington, were used to estimate wind-generated storm waves for the site.

Table 2 outlines the extreme winds (2-year to 100-year) based on data from the West Point station from 1985 to 2000.[1] Figure 2 shows the wind speed distribution for the West Point station over that same time period. Due to the location of the West Point station (near the lighthouse at Discovery Park), the westerly wind component is not fully captured in the data. This gives an artificially low wind (and therefore wave) condition from the west. To supplement the West Point data for westerly winds, extreme winds from the Seattle-Tacoma International Airport for directions between 210 degrees and 330 degrees[2] were used for the wave prediction and are outlined in Table 3. Figure 3 shows the wind speed distribution for the Sea-Tac station.

Table 2
West Point, Washington Extreme Winds (mph) 1985 to 2000

Start Degrees	End Degrees	2-year	10-year	20-year	50-year	100-year	Max Observed
0	45	22	26	28	30	31	29
46	90	12	16	17	18	19	19
91	135	18	22	22	23	23	23
136	180	36	46	49	54	57	48
181	225	39	45	46	48	49	48
226	270	22	28	30	32	34	30
271	315	9	15	18	22	25	19
316	360	25	32	35	39	42	38

Note: mph = mile per hour

[1] Extreme wind speeds are estimated from the data set using the Weibull distribution.
[2] Directions for wind speeds represent the direction the wind is coming from. 0 degrees is due north, and directions increase in the clockwise direction.

Table 3
Sea-Tac International Airport Extreme Winds (mph) 1984 to 2014

Start Degrees	End Degrees	2-year	10-year	20-year	50-year	100-year	Max Observed
211	240	30	36	38	41	44	46
241	270	21	27	29	32	34	35
271	300	15	18	19	20	20	21
301	330	16	21	23	25	27	28

Note: mph = mile per hour

Directions that can produce storm waves that can impact the project site are from the south-southwest (210 degrees) to due north (360 degrees). Storm waves for the 2-year through 100-year storm events were estimated based on extreme wind speeds from those directions (Tables 2 and 3). The largest predicted wind speeds for each return-period (between Sea-Tac International Airport and West Point) were used to estimate storm waves. Table 4 outlines which wind speeds were used for each direction, and the resulting estimated wave height and period.

Table 4
Extreme Wave Predictions

				2-year			10-year		
Direction	**Station**	**Fetch (mi)**	**Average Depth (feet)**	**Wind (mph)**	**Hs (ft)**	**Tp (sec)**	**Wind (mph)**	**Hs (ft)**	**Tp (sec)**
210-240	**Sea-Tac**	**8.8**	90	30	2.7	3.2	36	3.4	3.6
240-270*	**West Point**	**7.6**	90	22	1.7	2.6	28	2.3	3
270-300	**both**	**8.9**	50	15	1.1	2.1	18	1.4	2.4
300-330	**Sea-Tac**	**4.2**	90	16	0.8	1.8	21	1.2	2.2
330-360*	**West Point**	**5.3**	120	25	1.7	2.5	32	2.3	2.9

	20-year			50-year			100-year		
Direction	**Wind (mph)**	**Hs (ft)**	**Tp (sec)**	**Wind (mph)**	**Hs (ft)**	**Tp (sec)**	**Wind (mph)**	**Hs (ft)**	**Tp (sec)**
210-240	38	3.7	3.7	41	4.0	3.8	44	4.4	4.0
240-270*	30	2.5	3.1	32	2.7	3.2	34	3.0	3.3
270-300	19	1.5	2.4	22*	1.8	2.6	25*	2.1	2.8
300-330	23	1.3	2.3	25	1.5	2.4	27	1.6	2.5
330-360*	35	2.6	3.1	39	3.0	3.3	42	3.3	3.4

Notes:
*Wind from West Point Station; all others from Sea-Tac International Airport
Direction in degrees from true north
ft= foot
sec= second
mph = mile per hour
Hs= significant wave height
Tp= peak wave period

Results of the wind-wave hindcast show that the largest storm waves impact the site from the southwest (210 to 240 degrees) and range from 2.7 feet for the 2-year storm to 4.0 feet for the 100-year storm. Large waves can also impact the site from the north (330 to 360 degrees), ranging from 2.5 to 3.5 feet for the 2-year to 100-year storms, respectively. Waves from the west are about 20% smaller than those from the southwest and north directions.

LITTORAL DRIFT

Littoral drift (also called longshore transport) of beach sediment is the transport of sediment parallel to the shoreline due to waves breaking on the shoreline. The rate of littoral drift is dependent on the average wave conditions (heights and directions) at the site, the orientation of the shoreline compared to the average wave direction, the slope of the beach, and beach sediment size. Net littoral drift is a measure of the net volume of sediment moved along the beach on an annual basis, and is generally based on average or median wave conditions throughout the year.

To estimate littoral drift volumes at the project site, the median wind speeds for the same direction bins shown in Table 4 were used to estimate median wave heights and periods. This results in "everyday" wave conditions, which were used to estimate annual littoral drift. The Coastal Engineering Research Center (CERC) formula (taken from the *Shore Protection Manual;* CERC 1984) was used to estimate drift rates; results of these calculations are shown in Table 5. An empirical value (K) is required for the CERC formula based on field data and laboratory research. A K value of 0.03 was used for this estimate based on previous work at Seahurst Park, a similar site located 27 miles to the south (Anchor QEA 2012a), which included a calibrated shoreline change model used to establish a K value for similar conditions to the current project site.

A net drift rate of approximately 300 cubic yards per year (yd^3/yr) (230 cubic meters per year [m^3/yr]) toward the north was estimated for the Site using the CERC formula and median wind data from directions 211 through 360, as shown in Table 5. This compares closely to a measured site, Mount Baker Terminal, 6.5 miles to the north, which had an estimated 150 to 300 yd^3/yr (115 to 230 m^3/yr) net littoral drift rate calculated from yearly survey data (Anchor QEA 2012b). This littoral drift rate represents a transport rate for fine to medium gravel materials based on the reference sites used to calibrate the calculations. This transport rate will decrease over time as the percentage of finer gravels in the surface sediments decreases, as the beach "self-armors." Therefore, 300 cubic yards per year is an upper bound for littoral drift at the project site.

Table 5
Estimated Littoral Drift Rates

Direction	Wind Station	Median Wind (mph)	Hs (ft)	Tp (sec)	% time	Littoral Drift* (yd^3/year)
211-240	Sea-Tac	9	0.61	1.59	11.3%	419
241-270		6	0.33	1.18	3.5%	14
271-300		6	0.35	1.22	3.6%	-17
301-330		6	0.26	1.05	2.7%	-12
331-360	West Point	9	0.49	1.43	9.2%	-98
					Total:	**306**

Notes:
*Positive is to the north and negative is to the south.
Direction in degrees from true north
% time refers to the percent of the time that the waves impact the site from a given direction
ft= foot
sec= second
mph = mile per hour
Hs= significant wave height
Tp= peak wave period

MIGRATION OF CREEK CHANNEL ON DELTA

The combination of high, sediment laden flows from Lund's Gulch Creek, storm waves, and net littoral drift work together to change and shape the creek delta. As shown in Figure 4, the creek channel alignment over the delta changes with time depending on creek flow and wave conditions. During and following a high-flow event, the creek cuts a channel through the delta straight out into the Sound (1990 photo, Figure 4). Sediment from the creek that is transported through the existing culvert/tunnel is deposited on the delta during the high-flow event. Over time, when the creek is not flowing at peak flows, the "everyday" wave climate results in a net littoral drift that moves the newly deposited sediment northward. As the sediment moves to the north, it pushes the outlet of the channel to the north as well (2002, 2014, and large current photos, Figure 4). The cycle of migration shown from 1990 to 2002 in Figure 4 will occur in the future once the creek flows are large enough to cut a channel through the delta.

In addition to the impacts of creek flow and littoral drift on creek migration at the delta, storm waves also have an impact. Large storm waves that impact the delta can erode finer sediments from portions of the delta in deeper water and create a swash zone berm (material pushed upland due to waves breaking), which is a signature feature of gravel beaches. Figure 5 shows a photograph of the delta taken from overwater; the beach berm feature is labeled on the photograph. The berm acts as a naturally formed wave break for the upland portions of the delta. As shown in the 2010 photo in Figure 4, waves from the north and northwest can create a berm that pushes the alignment of the creek landward toward the railroad prism. At present, not shown in any site photos in Figure 4, this northern berm is present on the project site due to recent storms with strong winds and waves from the north.

The existing culvert/tunnel currently impounds a significant portion of the sediment load that is transported downstream by Lund's Gulch Creek. This material is removed by the County in order to maintain pedestrian access through the tunnel and hauled off-site, thus never making it to the littoral system.

ALTERNATIVES EVALUATION

The proposed alternatives for the project site are shown in Attachment A. Each alternative proposes to replace the existing tunnel/culvert with a bridge to allow unconfined flow for the creek and its sediment load from the gulch out onto the beach. These proposed changes will have impacts to the existing migration patterns of the creek channel on the delta, as well as future delta growth. This section provides a discussion of anticipated changes to existing coastal processes at the project site (described above) due to each proposed alternative, including potential for channel migration, sediment supply and distribution on the delta, and potential for wave impacts upland of the railroad berm.

Alternative 1

Alternative 1 provides a 30-foot clear opening for the creek (in the center span of the bridge) with an additional 10 feet available for creek migration within the northern bridge span (abutment span). The proposed opening is in line with the existing creek alignment (see Attachment A).

Potential for Channel Migration

This alternative increases the width of the channel at the mouth from 6 feet (existing culvert tunnel) to 40 feet, providing a larger area for the creek to migrate. Based on results of the Hydrology and Hydraulics Study, sediment load from Lund's Gulch Creek will accumulate just upstream and within the new opening, as well as downstream of the opening on the delta. The wider channel provided by the bridge proposed for Alternative 1 will allow the incoming sediment load from the creek to be distributed over a wider area and backwater effects are expected to be absorbed with the creation of the brackish wetland/estuary upstream of the bridge. At higher flows, the accumulated sediment within the creek mouth will be mobilized in the flow and transported farther out onto the delta. This ongoing process of sediment accumulation and transport will allow for more complexity in the channel alignment at the mouth, including the potential for multiple or braided channels to form. The flowpaths, size, and number of channels formed at the mouth will be dynamic over time and dependent on recent sediment supply and deposition from upstream, tides, and storm waves from Puget Sound.

Sediment Transport and Distribution on the Delta

Alternative 1 will allow all of the sediment load from the creek to stay within the creek migration zone at the mouth and eventually be transported to the delta and beach. At present, much of this sediment load is impounded upstream of the existing culvert/tunnel and removed from the system in order to maintain pedestrian access to the beach. Sediment that can be transported though the culvert is deposited on the delta within a narrow reach downstream of the culvert. The wider opening proposed for Alternative 1 will allow sediment to be deposited within a wider area at the mouth, and significantly reduce the potential for backwatering and upstream flooding due to sediment deposition. The changes to sediment transport patterns will allow the delta to grow inland (as well as waterward) and will likely extend upstream of the new opening into the Park area. In addition, lack of directed flow out of the culvert during high-flow events may alter the creek migration patterns on the delta. The energy from high flows in the creek will be distributed over a greater area, and it will likely require a larger flow to breach the berm on the delta and create a straight channel (see 1990 photo in Figure 4). The location and orientation of the berm on the beach will likely change as sediment is deposited in different areas of the delta, as opposed to primarily in front of the existing culvert/tunnel.

The sediment load estimated for Lunds Gulch Creek is 80 cubic yards annual average; however sediment delivery to the creek is episodic with an average of 400 cubic yards transported through the creek for a single large rainfall event. Using the lower end of the probable range of littoral drift rates for the site (150 to 300 cubic yards per year); sediment from one large rainfall event (400 cubic yards) could be retained on the delta for up to 2.5 years. Depending on the frequency and timing of large rainfall events and larger wind-wave events, the delta is likely to go through periods of growth and erosion oscillating around an average shoreline location.

Potential for Wave Impacts Inside the Park

Storm waves from Puget Sound move sediment on the outer portions of the delta forming berms at or near the MHHW line. These berms act as a natural wave breaks for storm waves, thus protecting the backshore areas of the delta from erosion due to direct wave impact. Alternative 1 should allow for continued formation of these berms and may be beneficial to berm formation due to increased sediment load reaching the nearshore area. In addition, the elevations of the backshore area of the delta are at or above MHHW elevation (including the current channel thalweg). Sediment deposition within the opening and out onto the delta is expected to keep elevations in these areas above MHHW. Therefore, the wider opening constructed as part of Alternative 1 is not expected to increase potential for wave impacts inside the Park.

Alternative 2

Alternative 2 provides a 40-foot clear opening for the creek (in the center span of the bridge) with an additional 20 feet available for creek migration within the northern and southern bridge spans (abutment spans). The proposed opening is aligned to the north of the existing creek alignment (see Attachment A).

Potential for Channel Migration

This alternative increases the width of the channel at the mouth from 6 feet (existing culvert tunnel) to 60 feet, providing a larger area for the creek to migrate. The impacts on channel migration potential for this alternative are in line with those for Alternative 1. However, the creek will be re-aligned to the north of its current (and historical) alignment as part of this alternative. This would require additional modifications to the creek farther upstream than for Alternative 1 in order to develop a sustainable new alignment for the channel at the creek mouth.

Sediment Transport and Distribution on the Delta

Alternative 2 will have similar impacts to sediment transport and deposition on the delta as Alternative 1. The main difference is that the creek outlet will be moved north of its current (and historical) condition. The sediment depositional area on the delta will therefore be moved to the north, and the delta will likely go through a transition phase following construction of Alternative 2. Sediment on the southern portion of the delta may begin to erode due to lack of replenishment from upstream and the net littoral drift to the north. The northern portion of the delta will expand as sediment is deposited directly in that area from upstream creek flow. The net littoral drift to the north may also move the extent of the delta farther to the north than its current extent. Over time, the entire delta will likely shift somewhat to the north.

Potential for Wave Impacts Inside the Park

Alternative 2 will behave similarly to Alternative 1 in terms of storm wave impacts. It is not expected that Alternative 2 will increase potential for wave impacts inside the Park.

Alternative 3

Alternative 3 provides two 40-foot clear openings for the creek (in the center spans of the bridge) with an additional 10 feet available for creek migration within the northern bridge spans (abutment span). The proposed opening is centered around the existing (and historical) creek alignment (see Attachment A).

Potential for Channel Migration

This alternative increases the width of the channel at the mouth from 6 feet (existing culvert tunnel) to 90 feet, providing a significantly larger area for the creek to migrate. The impacts on channel migration potential for this alternative are in line with those for Alternative 1. However, the significantly larger opening for the creek (compared to Alternatives 1 and 2) will provide opportunity for significantly more complex channel formation at the mouth.

Sediment Transport and Distribution on the Delta

Alternative 3 will have similar impacts to sediment transport and deposition on the delta as for Alternative 1. As with potential for channel migration, the much larger opening will provide opportunity for sediment distribution and transport over a much larger area than either Alternatives 1 or 2, both within the opening itself as well as upstream and downstream of the new bridge, depending on flows and sediment loads post construction. This growth of the delta upstream of the opening will most likely be larger (across channel) than for the other alternatives. In addition, sediment deposited in some areas of the mouth may have a higher retention time in the lower creek compared to Alternatives 1 and 2 because this opening is much larger than is required to transport expected sediment loads at high flows. It is possible over time that sediment deposited during a high-flow event will remain outside the influence of the creek channel long enough to become vegetated. This could result in longer-term filling in of portions of the creek mouth if the entire width of the creek migration zone under Alterative 3 is not required to support creek hydraulics. These areas may become vegetated over time, providing additional habitat opportunities in the lower creek.

Potential for Wave Impacts Inside the Park

Alternative 3 will behave similarly to Alternatives 1 and 2 in terms of storm wave impacts. However, if sediment is retained in the lower creek for longer periods of time than the other alternatives (or indefinitely), there may be less sediment being transported out on the delta. This could result in decreased berm formation and subsequent increase in erosion to backshore areas of the delta from direct wave impact. However, wave impacts to areas inside the Park (upstream of the opening) are not expected to occur with this alternative.

SEA LEVEL RISE CONSIDERATIONS

The elevations of the backshore area of the delta are approximately 1 to 3 feet above current MHHW (see Table 1). Elevations of low-lying areas just upstream of the opening are approximately 3.5 to 4 feet above current MHHW (2015). For mid-range sea level rise predictions for 2030 (0.2 foot), no significant changes to coastal processes or creek function are expected. By 2050, the increase in sea levels is predicted to be just over 0.5 foot, which will result in increased water surface elevations in the Park area during higher tides and some landward progression of the shoreline of the delta. The delta could potentially expand into the Park through and upstream of the opening in order to retain backshore beach area. In 2100, mid-range sea levels are expected to be 2 feet higher than the present. This will have a significant impact to the delta because much of the existing delta will be submerged at higher tides. Flooding in the lower reaches of the Park near the mouth will likely be severe; the restored estuary area inside the Park (shown in Attachment A) for all alternatives will become larger by 2100 and the recreational area within the Park and on the beach will be significantly depleted. It is possible that continued sediment loads from Lund's Gulch Creek will build up the mouth upstream of the opening, and a pocket beach area will form within the mouth and lower reaches of the Park.

REFERENCES

Anchor QEA, LLC (Anchor QEA), 2012a. *Design Analysis Report. Seahurst Park Phase II Shoreline Ecosystem Restoration*. 95% Submittal. Prepared for the U.S. Army Corps of Engineers. February 2012.

Anchor QEA, 2012b. *Alternatives Evaluation and Basis of Design Report. Nearshore Sediment Assessment*. Prepared for Snohomish County and the Snohomish Marine Resources Advisory Committee. March 2012.

CERC (Coastal Engineering Research Center), 1984. *Shore Protection Manual.* Department of the Army, Waterways Experiment Station, U.S. Army Corps of Engineers.

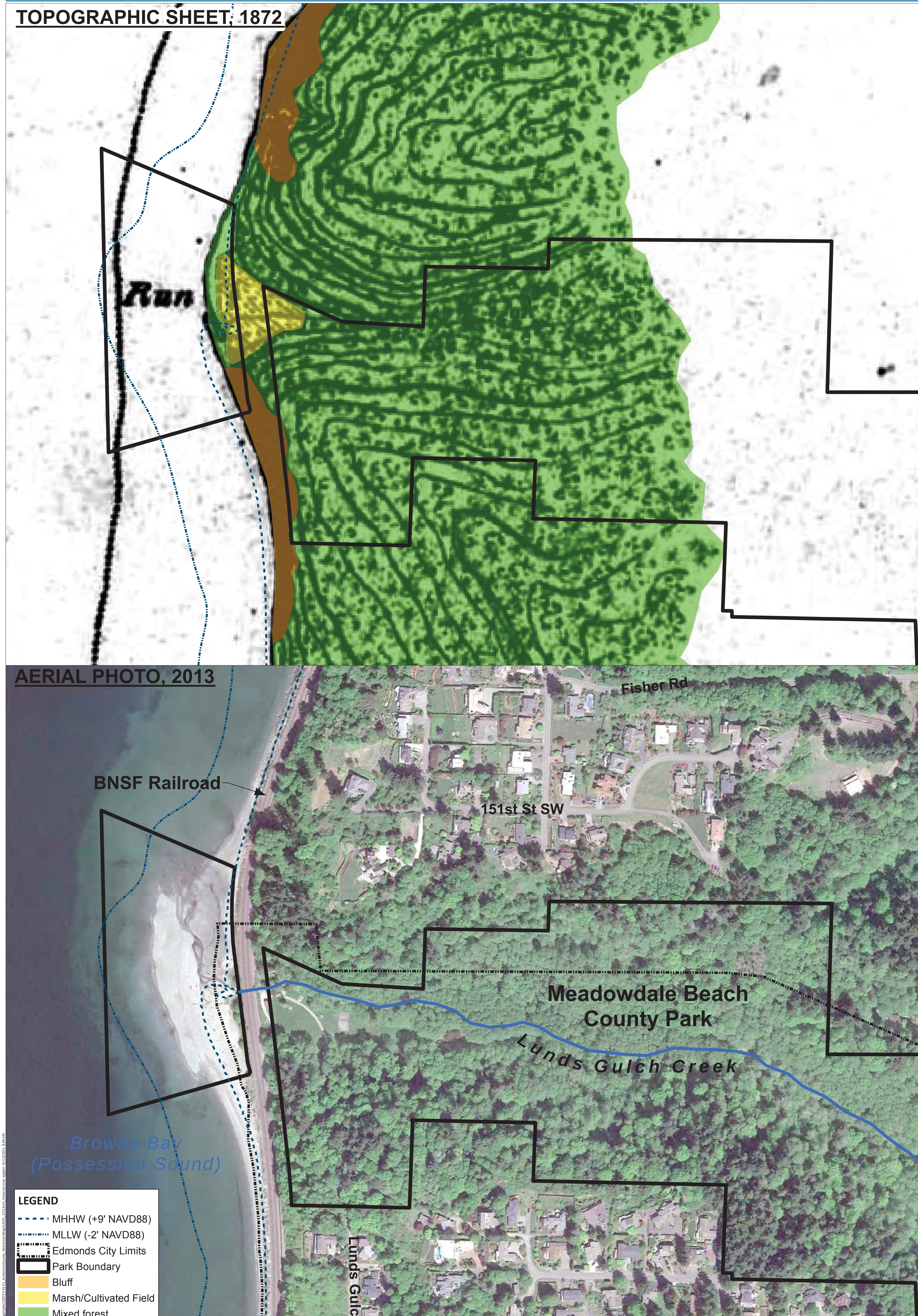
Ecology (Washington State Department of Ecology), 1991. *Net Shore-Drift in Washington State*. June 1991.

Finlayson D.P., Haugerud R.A., Greenberg, H. and Logsdon, M.G. (2000) Puget Sound Digital Elevation Model. University of Washington, (http://students.washington.edu/dfinlays/pugetsound/)

Snohomish County, 2002. *Puget Sound Tributaries Drainage Needs Report.* DNR No. 11. Snohomish County Public Works Department, Surface Water Management Division. December 2002. Available from: http://snohomishcountywa.gov/1079/Urban-Drainage

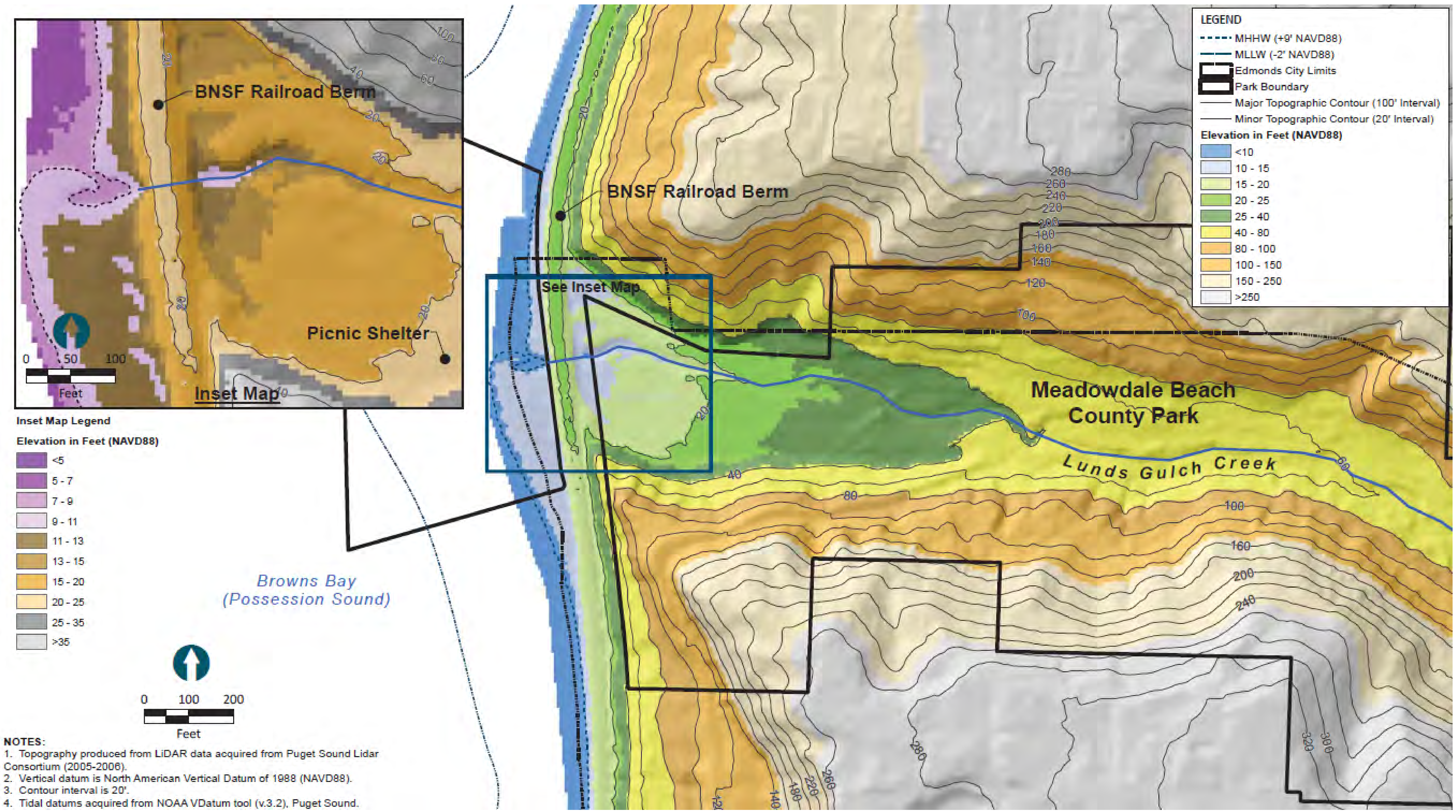
USACE (U.S. Army Corps of Engineers), 2002. *Coastal Engineering Manual.* Engineer Manual 1110-2-1100, U.S. Army Corps of Engineers, Washington, D.C. (in 6 volumes).

FIGURES



ANCHOR QEA

Figure 1 Historical Topography and 2013 Aerial Photo
Meadowdale Beach County Park Feasibility Study
Snohomish County, WA



NOTES:
1. Topography produced from LiDAR data acquired from Puget Sound Lidar Consortium (2005-2006).
2. Vertical datum is North American Vertical Datum of 1988 (NAVD88).
3. Contour interval is 20'.
4. Tidal datums acquired from NOAA VDatum tool (v.3.2), Puget Sound.

I:\Projects\Snohomish County\Meadowdale Beach Park\Task 5 - Studies\Coastal\Figures\Figure 2 Site Topography.docx

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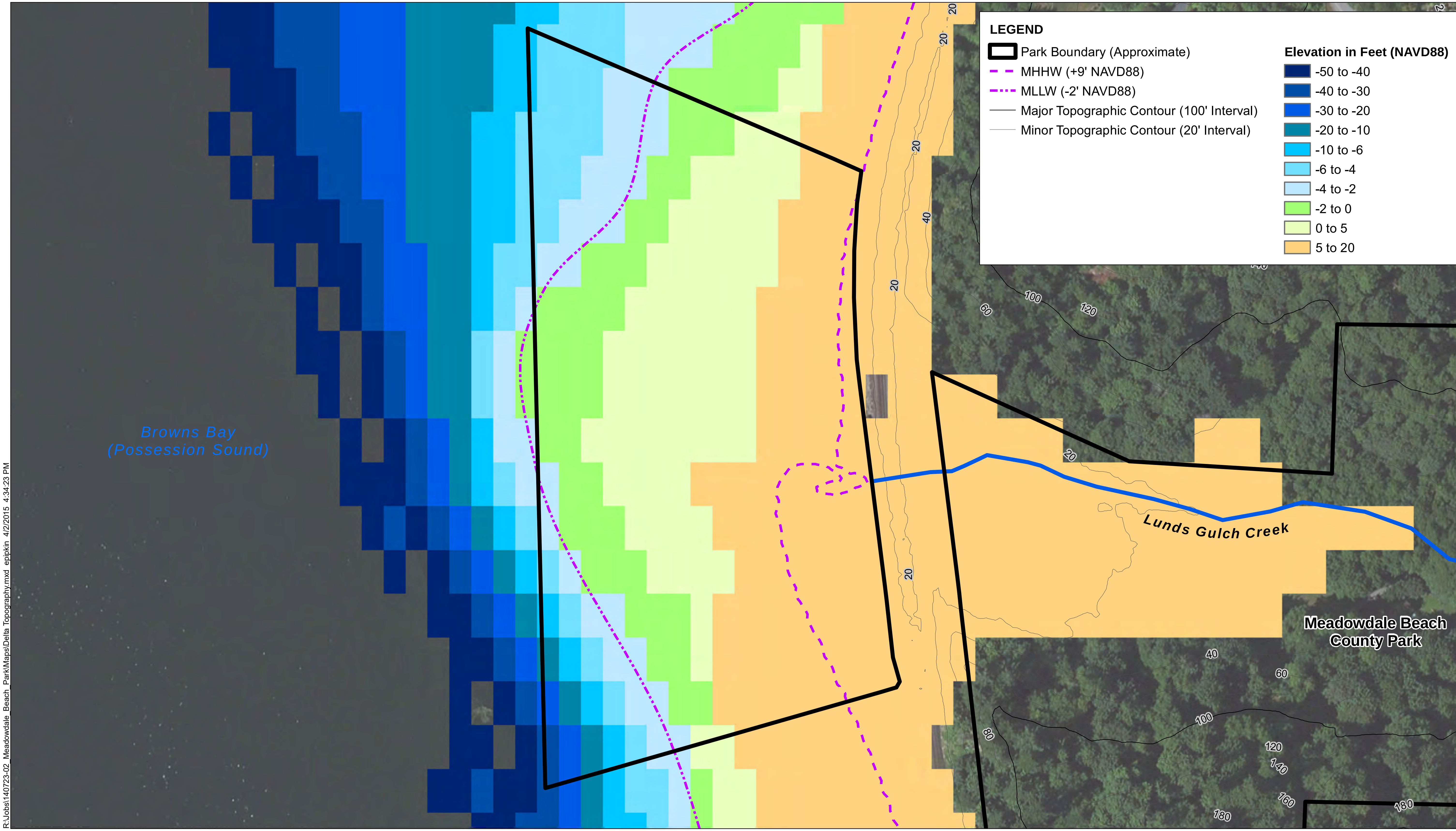
Figure 2
Site Topography (LiDAR)
Meadowdale Beach County Park Feasiblity Study
Snohomish County, WA



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NOTES:
1. Aerial image provided by ESRI.
2. Topography produced from LiDAR data acquired from Puget Sound Lidar Consortium (2005-2006).
3. Vertical datum is North American Vertical Datum of NAVD88.
4. Contour interval is 20'.
5. Tidal datums acquired from NOAA VDatum tool (v3.2), Puget Sound.
6. Delta topography from Puget Sound DEM (Finlayson, 2005).

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Figure 3
Lunds Gulch Creek Delta
Meadowdale Beach County Park Feasibility Study
Snohomish County, WA

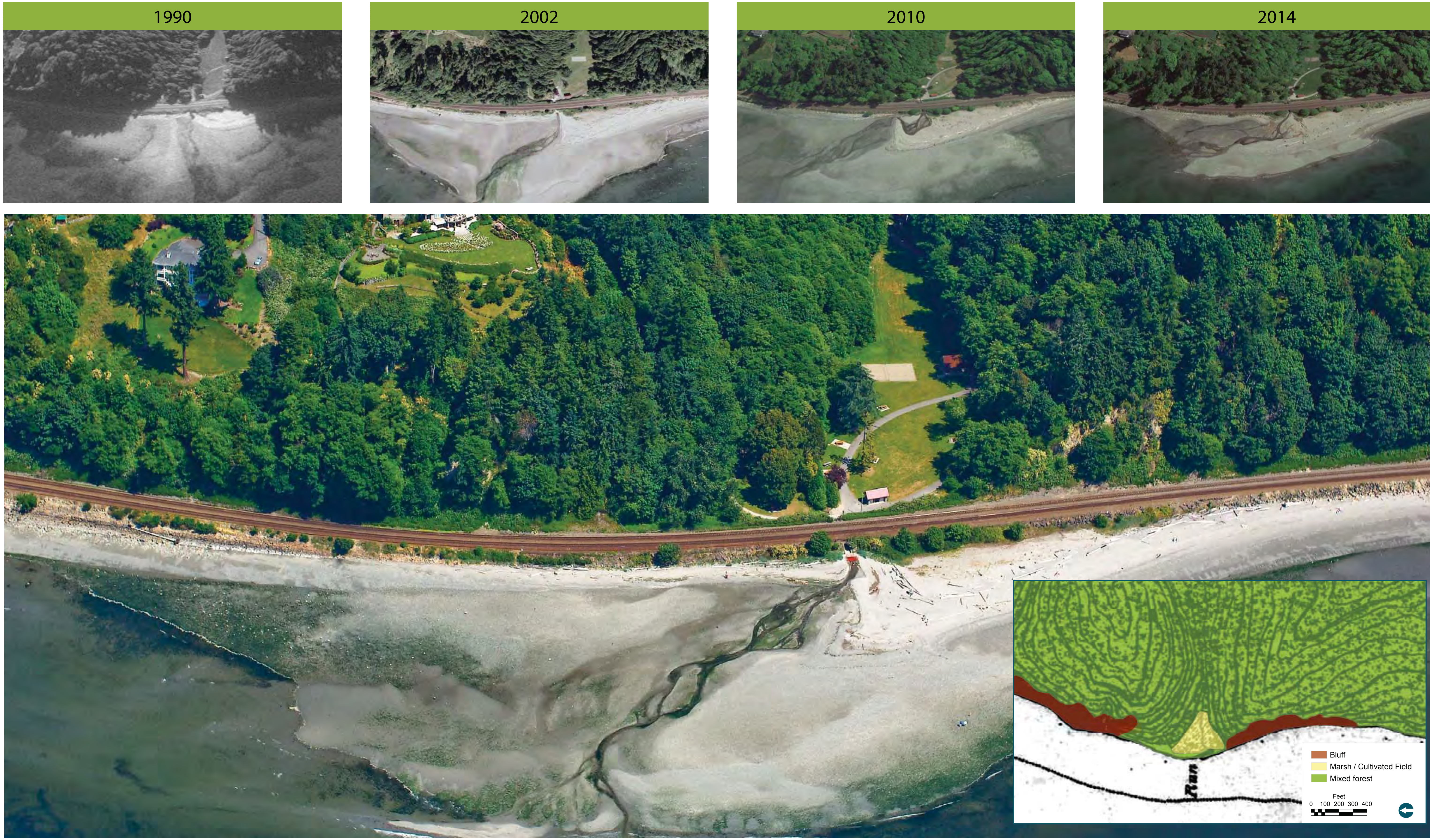

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Figure 4 Creek Outlet Migration

Meadowdale Beach County Park Feasibility Study

Snohomish County, WA

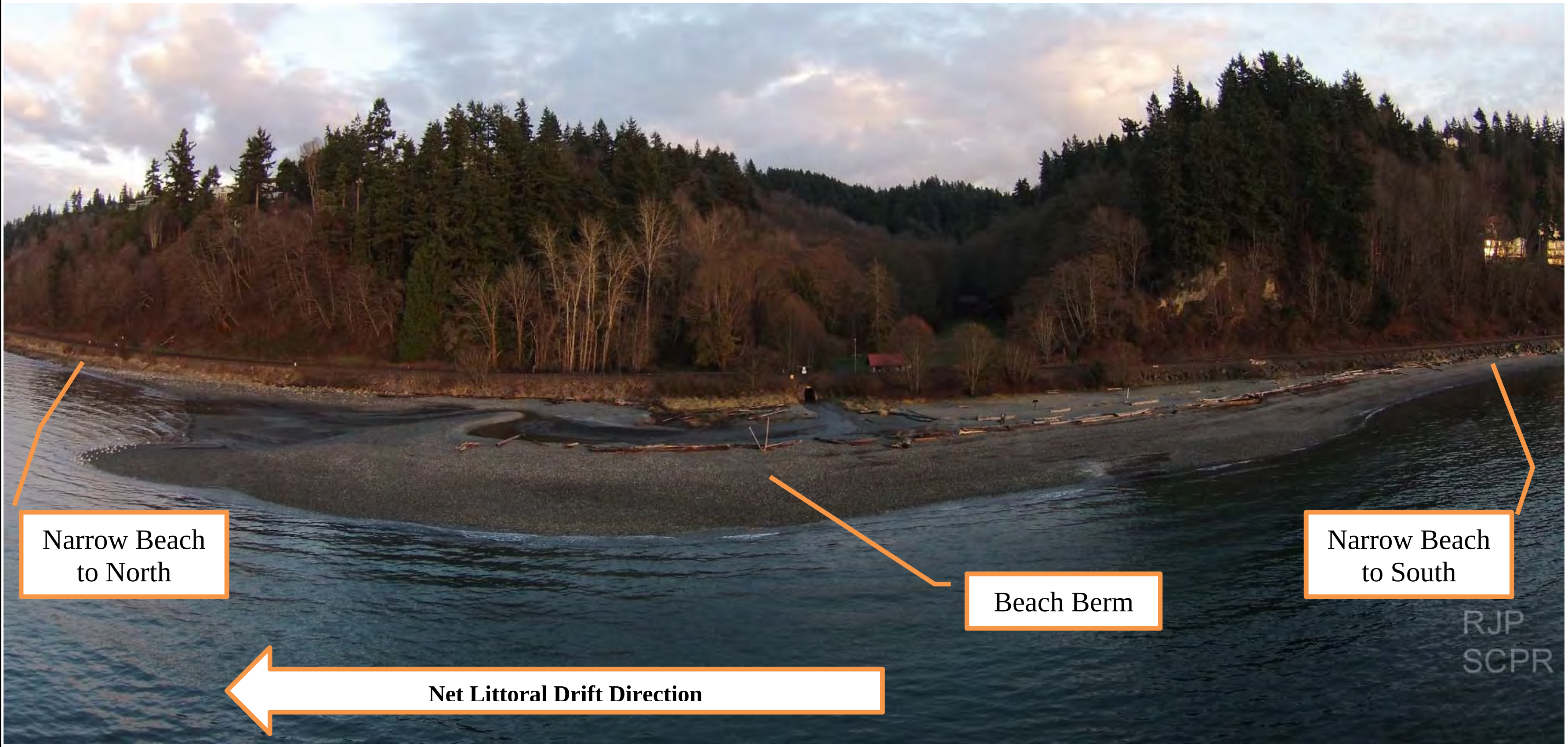

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Figure 5
December 2014 Site Photo; Beach Features
Meadowdale County Beach Park Feasibility Study
Snohomish County, WA

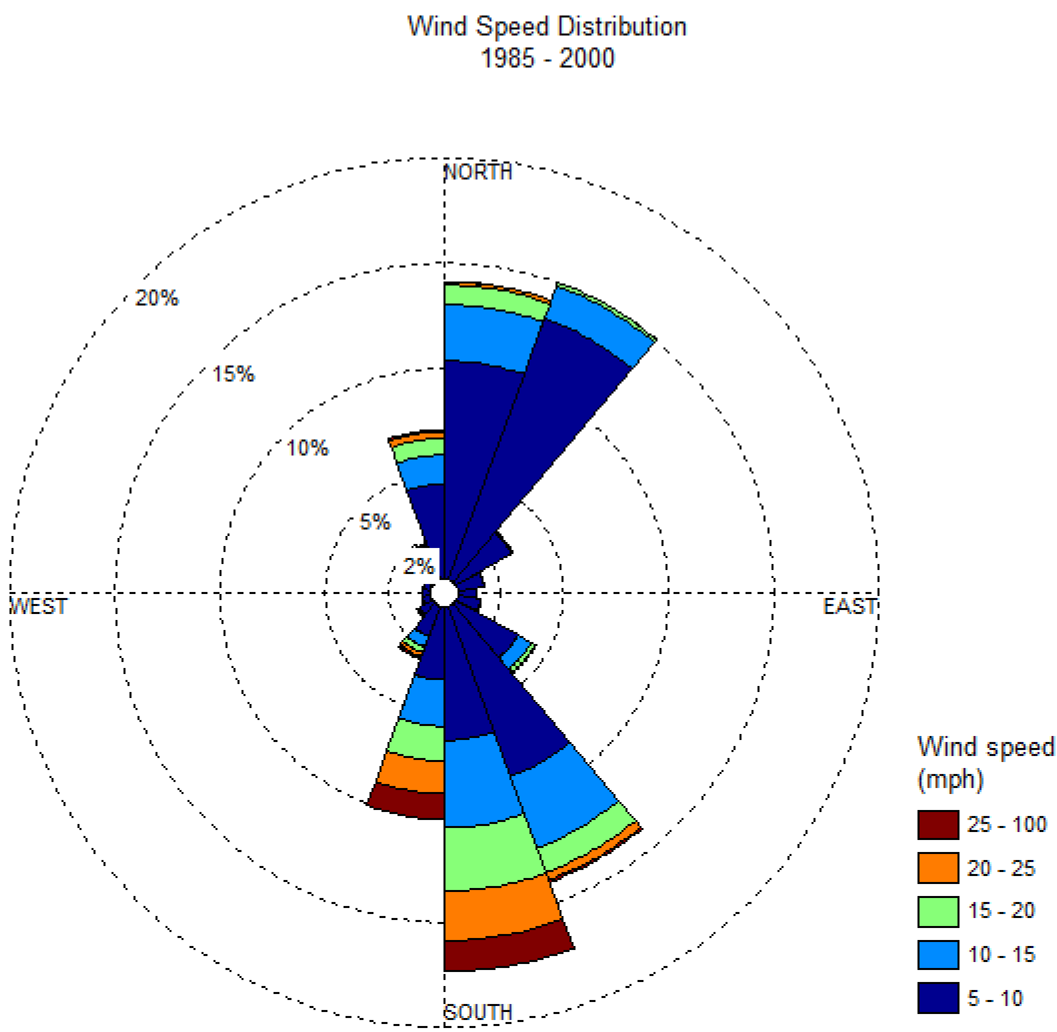

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Figure 6
Wind Rose, West Point Washington (Hourly Data 1985-2000)
Meadowdale Beach County Park Feasibilty Study
Snohomish County, WA

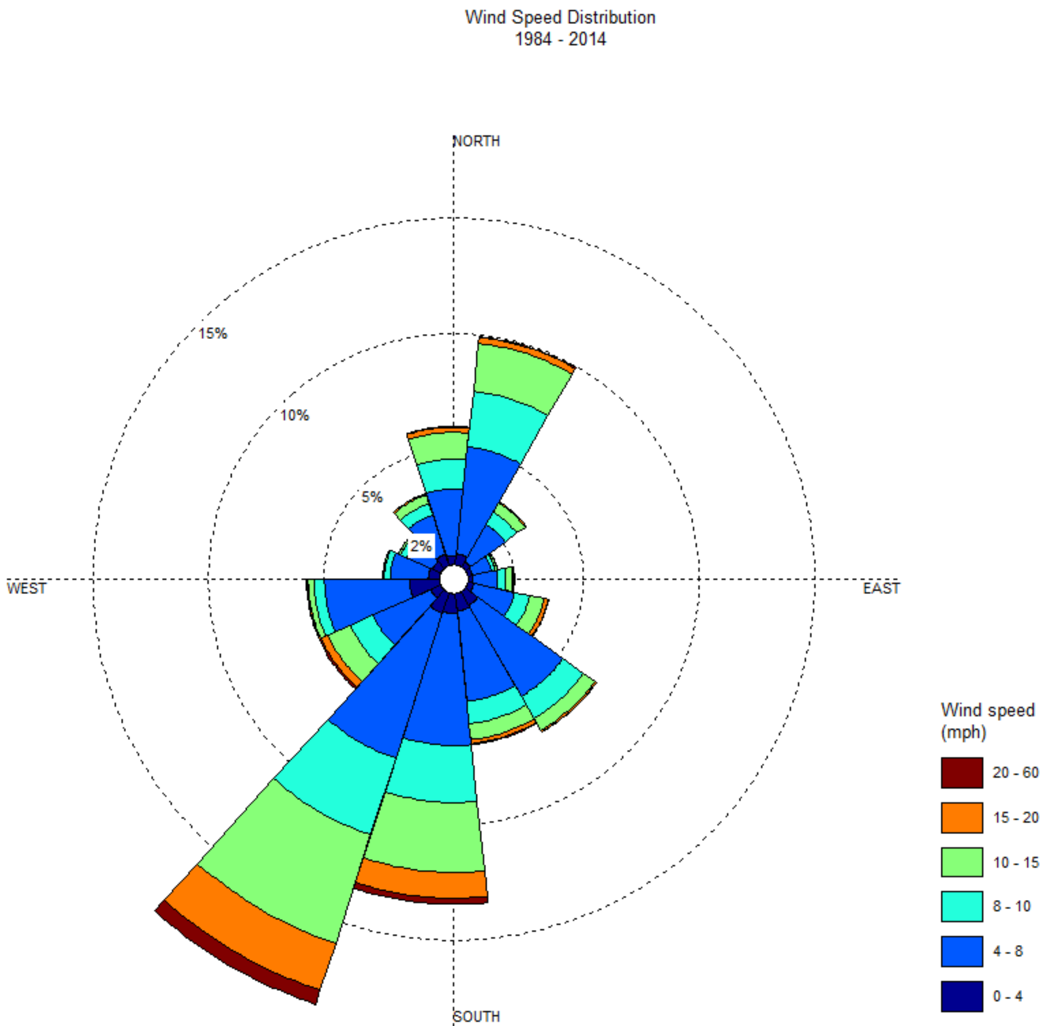

Figure 7
Wind Rose, SeaTac Washington (Hourly Data 1984-2014)
Meadowdale Beach County Park Feasibilty Study
Snohomish County, WA

ATTACHMENT A
PLAN AND SECTION VIEWS OF PROPOSED ALTERNATIVES

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
Revised on 3/9/2015 based on County feedback.

Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

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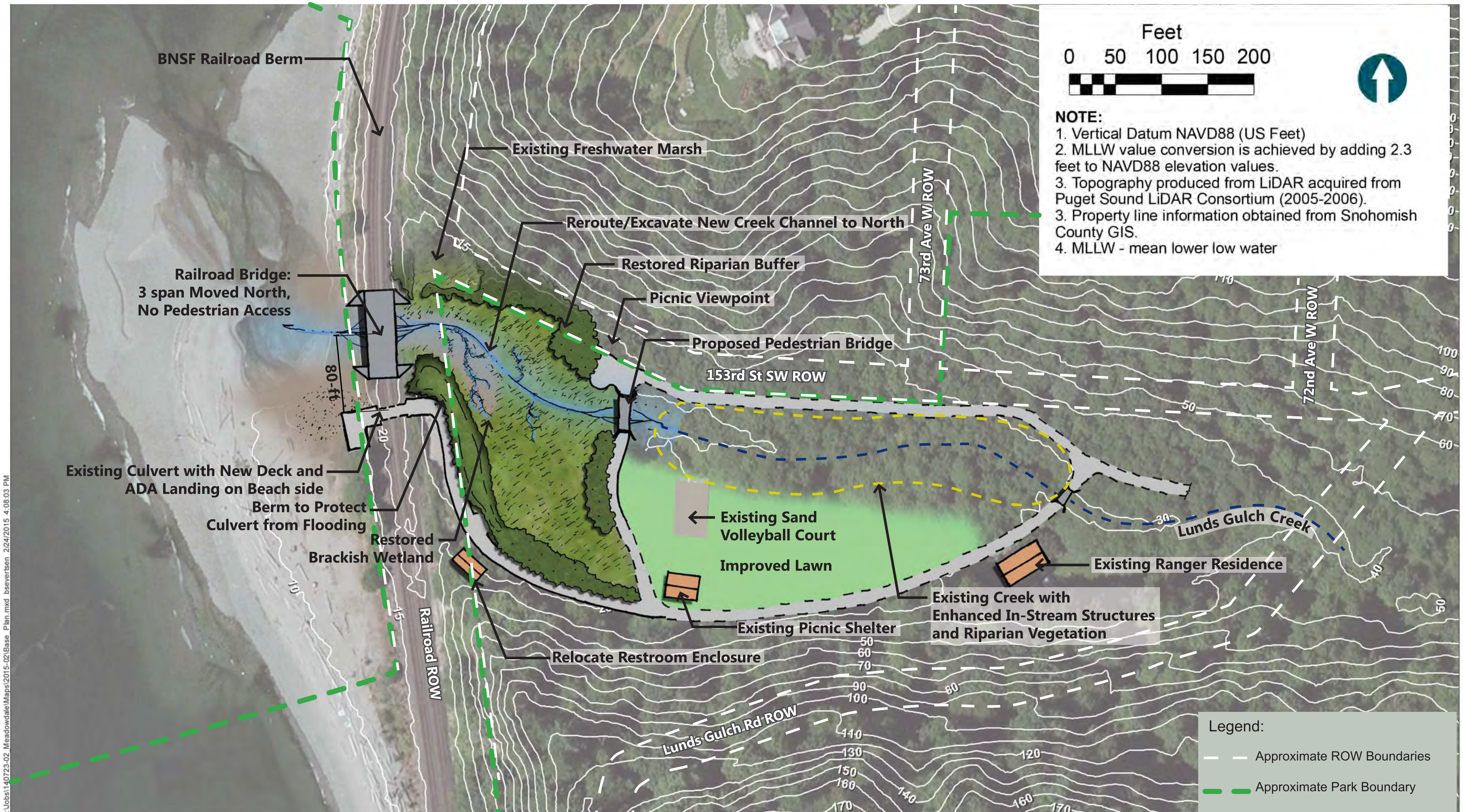
Revised on 3/9/2015 based on County feedback.



Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

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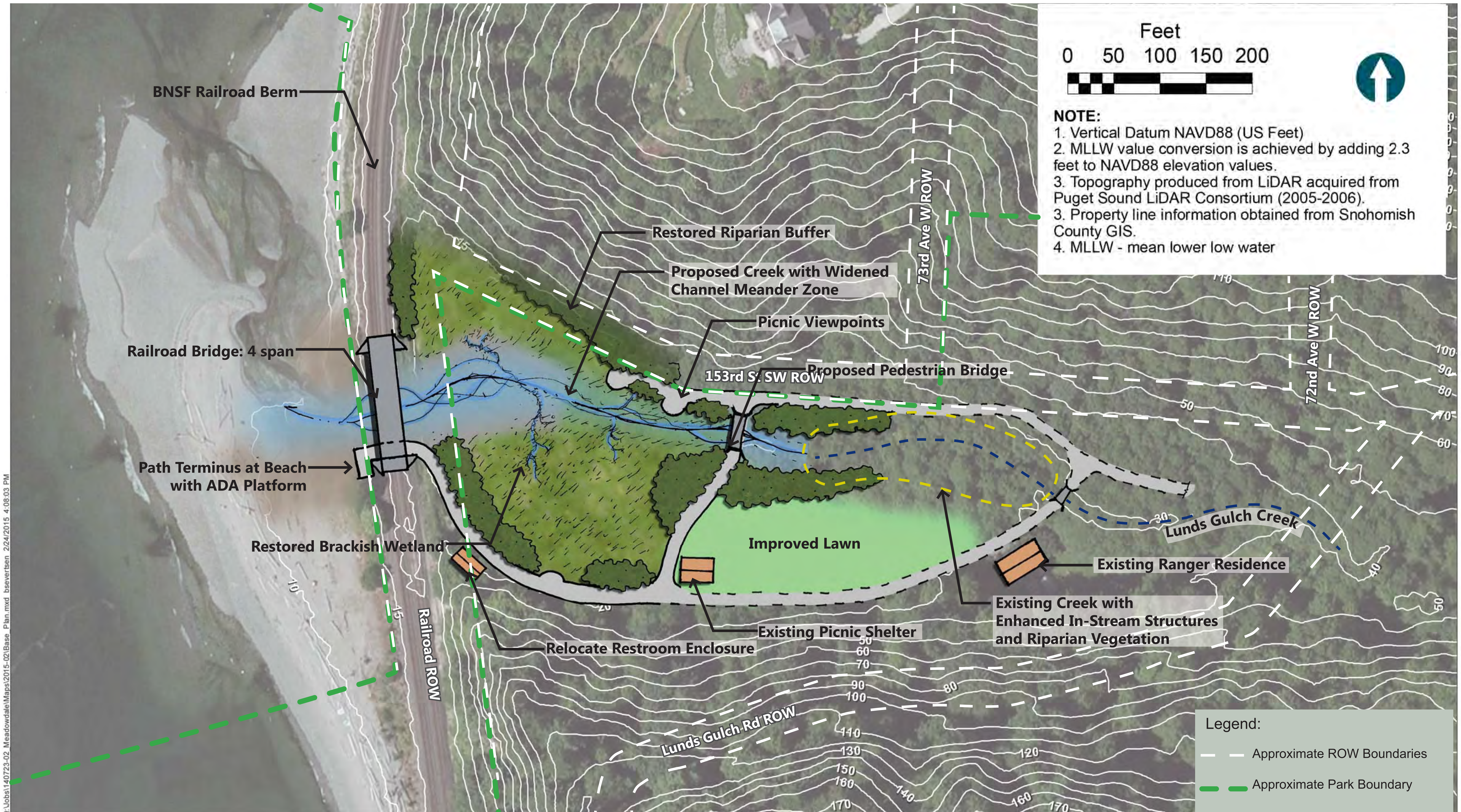
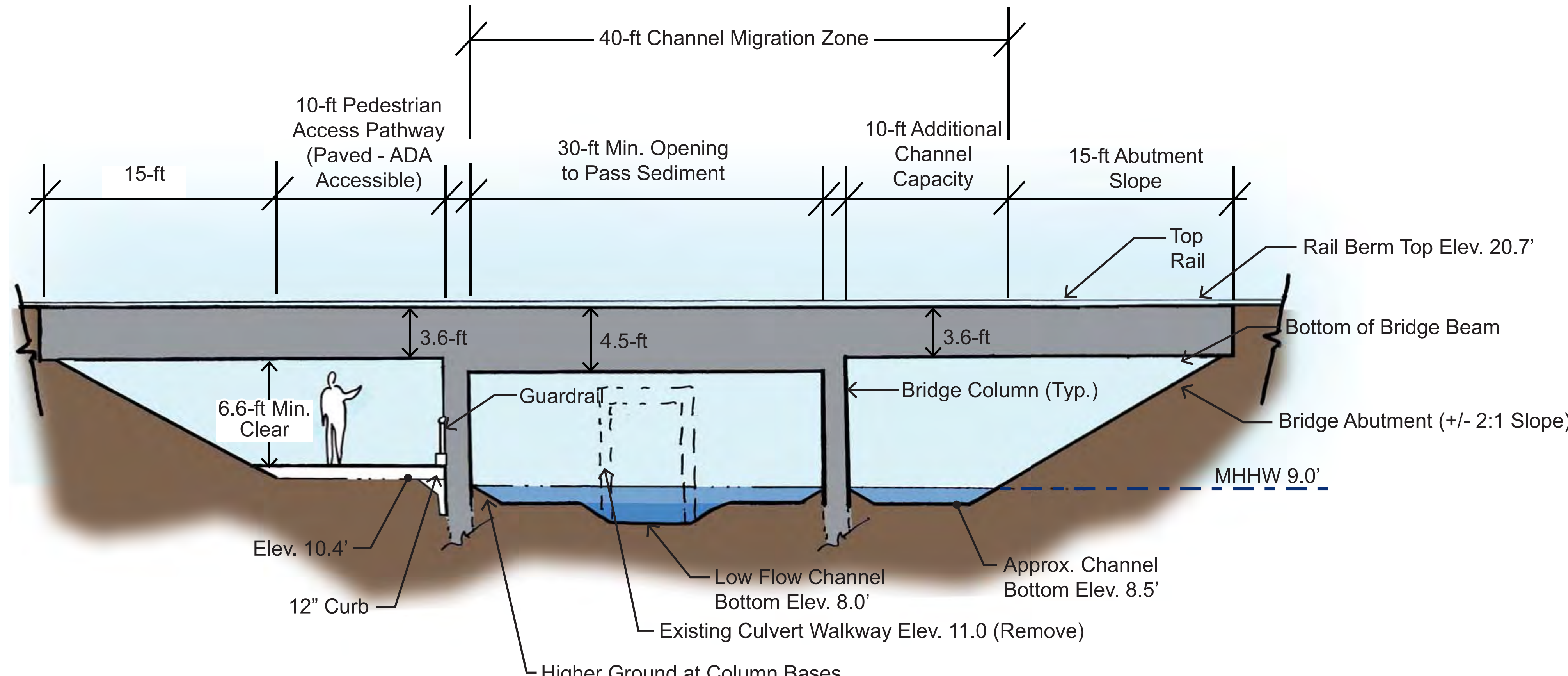
Revised on 3/9/2015 based on County feedback.



Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
Revised on 3/9/2015 based on County feedback.



Elevation Looking West

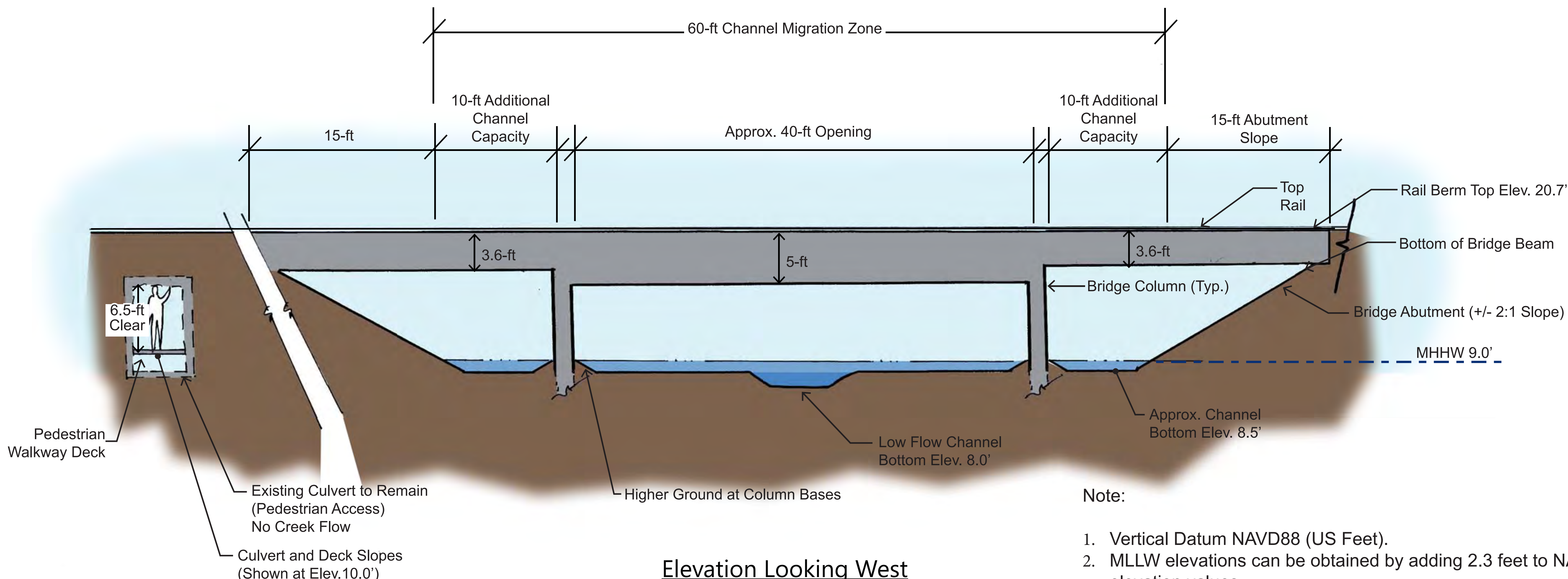
Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
Revised on 3/9/2015 based on County feedback.



Elevation Looking West

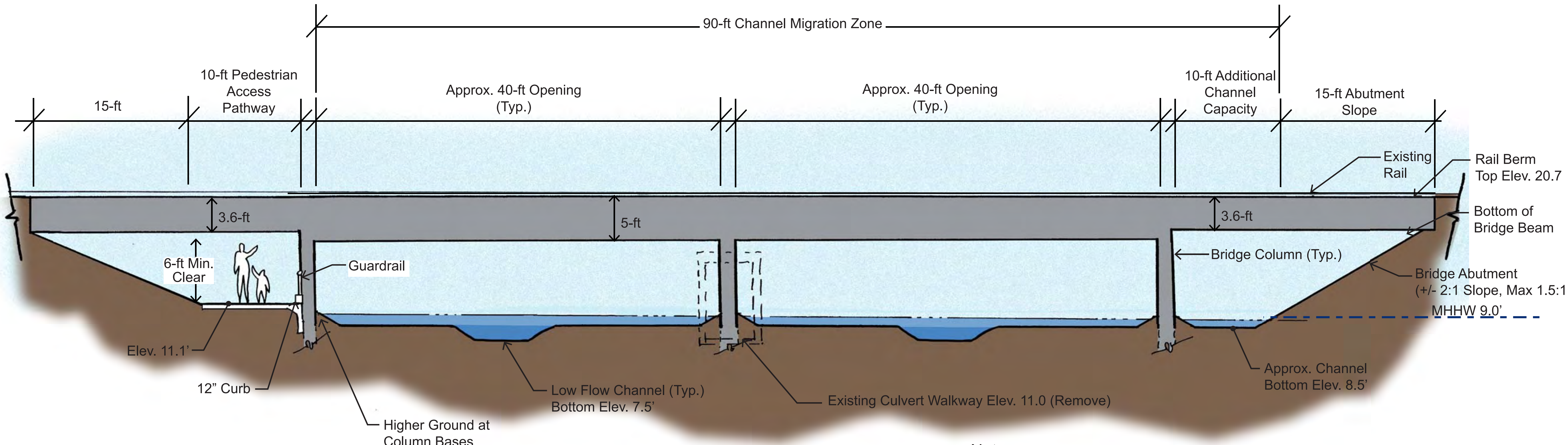
Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
Revised on 3/9/2015 based on County feedback.



Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat

APPENDIX I
CULTURAL RESOURCES EVALUATION MEMORANDUM

ANCHOR QEA

1605 Cornwall Avenue
Bellingham, Washington 98225
Phone 360.733.4311
www.anchorqea.com

MEMORANDUM

To:	Logan Daniels, Snohomish County Parks and Recreation	**Date:**	September 11, 2015
From:	Barbara Bundy, Anchor QEA, LLC	**Project:**	140723-02.01
Cc:	Kathy Ketteridge, Anchor QEA, LLC		
Re:	Meadowdale Beach County Park Feasibility Study – Cultural Resources Evaluation		

Snohomish County Parks and Recreation (County) contracted with the Anchor QEA team to conduct a feasibility analysis and alternatives evaluation to develop a preferred conceptual design plan for improving the Meadowdale Beach County Park (Park) existing railroad crossing, redeveloping the lower Park area, and providing salmon habitat restoration within the lower Lund's Gulch Creek and delta. The existing railroad crossing consists of a concrete box culvert that conveys creek flow, sediment, and pedestrian traffic to the beach at the creek delta on Puget Sound (see Figure 1 of this memorandum). The focus of the feasibility study is to address public safety issues involving the existing railroad crossing, improve ADA access to the beach, and improve habitat conditions for salmon in the lower creek and creek delta. The lower creek and delta are habitat for Endangered Species Act (ESA)-listed species including juvenile Puget Sound Chinook salmon. The potential for impacts to cultural resources (archaeological, historical, and tribal sites) has been identified as an evaluation criterion. This memorandum assesses the potential of the conceptual design alternatives to affect cultural resources.

PROJECT DESCRIPTION

The Park is located at 6026 156th Street Southwest in Edmonds, Snohomish County, Washington, in Section 5 of Township 27 North, Range 4 East. The 108-acre Park is owned and operated by the County. It extends from the rim of Lund's Gulch down to tidelands at the northern end of Browns Bay of Puget Sound. A BNSF rail bridge currently spans Lund's Gulch Creek through an approximately 6-foot-wide by 7-foot-high tunnel. Sediment buildup occurs in and upstream of the tunnel, causing problems for fish, park users, and park management. Three alternatives for improving beach access, fish habitat, and nearby park lowlands have been developed, as follows (see Figures 2 through 7 in the main body of the Feasibility Report).

Alternative 1: Three-span Bridge, Combined Creek and Pedestrian Access Route

This alternative provides the minimum bridge opening and the least change in terms of lawn area conversion and other recreation-related changes to the lower Park. It consists of a three-span bridge, with a 30-foot clear center span, and two 25-foot abutment spans centered on the location of the current tunnel and creek outlet alignment. The north abutment span will require 15 feet for the rock-slope abutment for the bridge and allow 10 feet of additional width for the creek channel. The south abutment span will also require 15 feet for the rock-slope abutment for the bridge but will provide a 10-foot-wide path for pedestrian access to the beach. The pedestrian access path will be set to an elevation approximately 1.2 feet above current mean higher high water (MHHW) and will provide 80 inches of vertical clearance (meeting Americans with Disabilities Act [ADA] requirements) from the path to the overhead bridge span.

A portion of the lower lawn area (16,100 square feet [sf]) will be converted to stream, marsh, and riparian habitat, and another 35,900 sf of habitat area will be restored by enhancing riparian vegetation and in-stream structures for a total restored habitat area of 52,000 sf, as shown in Figure 2 of the Feasibility Report. In addition, 7,650 sf of existing habitat will be enhanced upstream of the existing pedestrian footbridge across Lund's Gulch Creek by installing in-stream structures consisting of large woody debris, and by enhancing existing riparian vegetation. The loop path north of the proposed marsh will be truncated in order to avoid habitat fragmentation, and three picnic viewpoints will be established at the new path terminus. A new pedestrian bridge will be installed across the restored stream channel downstream of the existing pedestrian bridge. Drainage of the remaining lawn areas north of the existing volleyball court will be improved by a combination of subsurface drainage and regrading. Figures 2 and 3 of the Feasibility Report show a plan and section view, respectively, of proposed improvements.

Alternative 2: Existing Tunnel and Three-span Bridge to the North, Separated Creek and Pedestrian Access Routes

This alternative represents a midway between Alternatives 1 and 3 in terms of bridge size and extent of habitat restoration in the lower creek, as well as changes to the lawn area and recreation in the lower Park. It proposes a three-span bridge, with a 40-foot clear center span, and two 25-foot abutment spans located north of the current culvert location and creek outlet alignment. This will require re-alignment of the lower portion of the creek to accommodate the new location for the outlet. Both the north and south abutment spans will require 15 feet for the rock-slope abutment for the bridge and allow 10 feet of additional width (20 feet total) for the creek channel. The existing culvert will be separated from the creek channel alignment and modified for pedestrian access only with similar overhead clearance as currently exists on site. The pedestrian access path will be set to an elevation of approximately 10 feet North American Vertical Datum of 1988 (NAVD88), which is similar to its current elevation at the upstream end of the existing walkway. This configuration will not meet the ADA 80-inch vertical clearance requirement. Standing water may cover the path at tidal elevations higher than 10 feet NAVD88, which is a safety and ADA issue. Removal of this water and any associated sediment will be difficult because the lower end will be a closed depression. All of the lower lawn area, 30,600 sf, will be converted to stream, marsh, and riparian habitat, and another 31,000 sf of habitat area will be restored by enhancing riparian vegetation and in-stream structures for a total restored habitat area of 61,600 sf, as shown in Figure 4 of the Feasibility Report. In addition, 9,300 sf of existing habitat will be enhanced upstream of the existing pedestrian footbridge across Lund's Gulch Creek by installing in-stream structures consisting of large woody debris, and by enhancing existing riparian vegetation.

A new pedestrian bridge will be installed across the restored stream channel downstream of the existing pedestrian bridge. The northern path will be terminated just north of the proposed pedestrian bridge. A widened path section at the new terminus will accommodate a picnic viewpoint. Drainage of the remaining upper lawn area will be improved. Figures 4 and 5 of the Feasibility Report show a plan and section view, respectively, of proposed improvements.

Alternative 3: Four-span Bridge, Combined Creek and Pedestrian Access Route

This alternative represents the largest bridge span and provides the most conversion of lawn to natural habitat in the lower Park of the three alternatives presented. It consists of a four-span bridge, with two 40-foot clear center spans, and two 25-foot abutment spans centered on the location of the current culvert and creek outlet alignment. The north abutment span will require 15 feet for the rock-slope abutment for the bridge and allow 10 feet of additional width for the creek channel. The south abutment span will also require 15 feet for the rock-slope abutment for the bridge but will provide a 10-foot-wide path for pedestrian access to the beach. The pedestrian access path will be set to an elevation approximately 1.9 feet above MHHW and will provide 6 feet of vertical clearance from the path to the overhead bridge span, which is less than the 80-inch minimum required for ADA vertical clearance.

All of the lower and part of the upper lawn area (42,850 sf) will be converted to stream, marsh, and riparian habitat, with another 58,150 sf of habitat area restored by enhancing riparian vegetation and in-stream structures, for a total restored habitat area of 101,000 sf, as shown in Figure 6 of the Feasibility Report. In addition, 7,200 sf of existing habitat will be enhanced upstream of the existing pedestrian footbridge across Lund's Creek Gulch by installing in-stream structures consisting of large woody debris and by enhancing existing riparian vegetation.

A new pedestrian bridge will be installed across the restored stream channel downstream of the existing pedestrian bridge. The path connecting the picnic shelter to the northern path will be partially realigned, and the loop path north of the proposed marsh will be truncated in order to avoid habitat fragmentation. Two picnic viewpoints will be established at the new path terminus. Drainage of remaining lawn areas will be improved and the volleyball court will be converted to lawn area. Figures 6 and 7 of the Feasibility Report show a plan and section view, respectively, of proposed improvements.

ENVIRONMENTAL AND CULTURAL CONTEXT

Environmental Context

The Park is part of the shoreline of Puget Sound, Washington, near the generally understood boundary between the central and northern portions of the Sound. It is in the Puget Trough physiographic province, which is characterized by north-south trending ridges and troughs formed during the last glacial maximum in the late Pleistocene, the Vashon Stade of the Fraser Glaciation (Galster and Laprade 1991; Easterbrook 2003). Glaciers began to retreat about 14,500 years ago, leaving deposits of recessional outwash (Heller and Dethier 1981). As a result of glaciation, western Snohomish County is characterized by "rolling, benchlike" plains (Debose and Klungland 1983:1).

As the glaciers continued to melt, global sea level rose while the landmass rebounded. Around 9,000 years ago, isostatic rebound was complete but sea level was still rising, and early Holocene shorelines began to submerge. Shorelines in the area did not stabilize until the mid-Holocene, about 5,000 years ago (Thorson 1980). In addition to eustatic and isostatic sea level changes, the Snohomish delta area has been affected by tectonic activity. Sediments in the lower Snohomish River "reveal evidence of at least three episodes of liquefaction, at least one event of abrupt subsidence, and at least one tsunami since ca. A.D. 800" (Bourgeois and Johnson 2000:482).

Soils in the vicinity are the result of this history, with compacted glacial till (overridden by ice) overlain by looser glacial outwash and Holocene soils. Lund's Gulch Creek "incises through glacial and non-glacial soils from uplands of greater than 300 feet elevation to Puget Sound along a west-northwest trend in south Snohomish County" (Shannon and Wilson 2015:2).

The Park is in the "*Tsuga heterophylla* vegetation zone" (Franklin and Dyrness 1973:45). Prior to historic and modern logging and development, this zone was characterized by forests of western hemlock, Douglas fir (*Pseudotsuga menziesii*), and western red cedar (*Thuja plicata*) with understories of shrubs, ferns, and grasses (Franklin and Dyrness 1973:72-73). A variety of fauna would have been present in the area, including large and small mammals in the uplands, and fish, invertebrates, and waterfowl in the nearshore habitat.

Cultural Context

The earliest archaeological sites in the northern Puget Sound and Gulf of Georgia region date to the early to mid-Holocene around 8,100 to 4,400 years ago. The sites are attributed to the Old Cordilleran culture in British Columbia, and the Olcott Tradition in northwestern

Washington, and are classified as Archaic Period (Matson and Coupland 1995:78; Ames and Maschner 1999:67-72). The sites typically consist of stone tools, including leaf-shaped bifacial points and cobble tools, and lack evidence of permanent houses.

By the latter part of the mid-Holocene, larger populations began to organize in complex ways to exploit a wide range of terrestrial and littoral resources including salmon and shellfish; land mammals; and plant resources such as berries, roots, and bulbs. Cultures around Puget Sound and northward show "an unequivocal adaptation to coastal resources," though classic Northwest coast developments such as sizeable longhouses and large-scale storage are still absent (Matson and Coupland 1995:97).

Over time, populations grew and began to reside in large semi-sedentary cedar plank house villages located at river mouths and confluences and on protected shorelines. The artifact tool kits became increasingly complex and specialized, allowing for large takes of resources, which were processed and stored for year-long consumption (Ames and Maschner 1999). Archaeological expressions of late Holocene cultures are consistent with ethnographic descriptions.

The project area is located in the traditional territory of the Snohomish tribe, a Southern Coast Salish people who speak the Northern Lushootseed language. Salish peoples traditionally relied on a seasonal round that focused on fishing and also included hunting for sea and land mammals, gathering plant foods and medicines, and harvesting intertidal invertebrates (Suttles 1990). Villages consisted of large split-plank houses occupied by extended family groups, but seasonal camps used temporary shelters. The primary Snohomish village, *Hebo'lb*, was located approximately 12 miles north of the Park. There are a number of Salish placenames in the vicinity, according to informants of the ethnographer T.T. Waterman, including:

- *Stt!a'iyEb*, for a fish known as black rock cod, bullhead, or bullcod. The location appears to be just offshore of the Lund's Creek outlet.
- *Ca'ggwEs,* meaning "projecting cliff," for the promontory about a half-mile north of the Park.
- *KwiyEqwdi'yawai*, meaning "little cottonwood place," for Picnic Point about 1.5 miles north of the Park (Hilbert et al. 2001:342).

Salish communities felt the effects of Euroamerican contact prior to sustained interaction with Euroamericans. Introduced diseases had already caused shifts in population and settlement patterns by the time the first settlers arrived in the early 1820s (Ruby and Brown 1986:111,212). The Point Elliott Treaty of 1855 was signed in Snohomish territory, about 6 miles north of the Park in Mukilteo. The Snohomish were assigned to the Snohomish Reservation, which later became the Tulalip Reservation, along with several other tribes (Ruby and Brown 1986:213). Despite demographic and social changes, Snohomish people remain in the area today and practice many aspects of their traditional cultures.

The first Euroamerican contact in the area was in 1792, when George Vancouver's party landed on the beach south of *Hebo'lb*, but the area was not systematically explored until the 1850s (Oakley 2005). The first Euroamerican settlement in the vicinity was at Tulalip Bay in 1853. The Park area appears on several historic maps. An 1859 General Land Office map shows Lund's Gulch Creek but does not note any settlement in the vicinity; a more detailed U.S. Coast Survey map from 1872 labels the gulch a "Run" but has no other notations (Figures 2 and 3 of this memorandum).

The Meadowdale area, between Edmonds and Lund's Gulch Creek, was platted in the early 1870s by railroad speculators (Villigan 2011). The gulch itself became part of Norwegian immigrant John Lund's Donation Land Claim in 1878; his home in the Park stood until it burned down in the 1950s (Villigan 2011; Dees and Associates 1986). The Seattle and Montana Railway constructed the rail line along the Park waterfront in 1891, bringing the logging industry into the area (Coman and Gibbs 1949). The short-lived town of Mosher, just north of the Park, developed from the Mosher and McDonald Logging camp, and several shingle mills were located in Edmonds, to the south of the Park. Pope and Talbot operated a sawmill approximately 1.4 miles south of the Park.

Development in the Lund's Gulch vicinity was slow through the early 20th century because it was difficult to access from Seattle (Villigan 2011). The secluded Meadowdale area was used to move contraband during prohibition, with at least one major raid occurring on a beach in the area (LeWarne 2008). The Lund property changed hands several times, and while the area was "between owners" in the 1950s and 1960s, it was used as a "site for rabble-rousing" by local teenagers (Villigan 2011:6). At some time in the early 1960s, the lower portion of the gulch became the Meadowdale Country Club (Dees and Associates 1986). The Country Club "featured a clubhouse, manicured lawns, an Olympic-size swimming pool with bath houses, and a fish hatchery" (Dees and Associates 1986:2-10). It closed in the late 1960s, and the grounds reverted to "unruliness and vandalism" (Villigan 2011:6). Snohomish County acquired the parcel in 1968, after which the clubhouse burned down and the pool was filled in.

The Park closed to the public in 1979, primarily because there was no safe access road, and illegal and disruptive activities resumed. It reopened in 1988, with a ranger housed on site. The Park closed briefly in 1996 to 1997 to repair storm damage. The existing tunnel was constructed by BNSF, and later modified to accommodate pedestrian access, but is currently closed due to sedimentation.

Previous Research

There are no recorded archaeological sites in the Park, and there have been no cultural resources surveys in the Park. Two archaeological surveys have been performed within a mile of the Park, but neither located archaeological materials (Juell 2006; Goodwin and Daniels 2014). The nearest recorded site is 45SN368, a 195-foot-long historic road segment, the Picnic Point Road Spur. It is located about 1.4 miles northeast of the Park. A precontact shell midden, site 45SN009, is located approximately 1.4 miles south of the Park, at the location of the former Pope and Talbot sawmill. The site has been extensively disturbed but is still partly intact. There are no historic structures or tribal traditional cultural properties (TCPs) recorded at the Park.

COMPARISON OF ALTERNATIVES

Cultural Resources Potential at the Park

All three alternatives include demolition or modification to two existing structures: the restroom enclosure and the tunnel. The restroom enclosure is a recent addition to the Park. The date of construction of the existing tunnel is currently unknown. Therefore, there is only potential to impact historic structures if the existing tunnel is older than 50 years. Unless tribal consultation identifies TCPs, the potential to affect cultural resources is limited to disturbance of archaeological materials.

The Park's location in a fairly protected location near a year-round stream has the potential for precontact archaeological materials. A number of historic activities have occurred at the Park that may also be represented archaeologically, including railroad construction (an original trestle may be present under the existing railroad tracks), homesteading by the Lund family, and the Meadowdale Country Club. These historic activities may have disturbed any precontact or previous historic archaeological materials, but portions of earlier deposits can remain intact even in disturbed areas. Where Holocene sediments are present anywhere in the Park, outside the limits of recent disturbance, archaeological potential should be considered moderate to high.

Potential project activities have varying potential to impact cultural resources. Improvements to the lawn will likely consist of installation of drainage features to a depth of not more than 2 feet below the ground surface. Habitat restoration could include excavating channels and removing shoreline armoring, and ground disturbance would likely not exceed 6 feet below the ground surface. Construction of the new bridge, except where the existing tunnel is located, could disturb the original trestle, if it still exists under fill and ballast, as well as impact native sediments to an unknown depth where foundations are installed.

Therefore, alternatives with greater amounts of habitat restoration and longer bridges have greater potential to impact cultural resources.

Alternative 1

Ground disturbance for Alternative 1 includes construction of an 80-foot-long bridge, approximately 59,650 sf of habitat restoration and enhancement, construction of three picnic viewpoints, and improvement of the existing lawn. The existing culvert would be demolished. Because the bridge would be constructed within the location of the existing culvert, it will be within the footprint of existing disturbance. Potential for disturbance of archaeological resources is concentrated at work locations east of the bridge. Archaeological testing would be required to determine whether such resources are present.

Alternative 2

Ground disturbance for Alternative 2 includes construction of a 90-foot-long bridge north of the existing culvert, reconstruction and widening of the existing pedestrian path, 70,900 sf of habitat restoration and enhancement, and improvement of the existing lawn. The existing tunnel would be modified, but not demolished. Although there is more habitat restoration and enhancement in Alternative 2 compared to Alternative 1, it occurs at the location where lawn would be restored in Alternative 1, so the footprint of ground disturbance is essentially the same. The primary difference between the two alternatives' potential to affect archaeological materials is in the greater depth of disturbance for habitat restoration, and in construction of the bridge. Although the new location would still be along the rail line, there may be archaeological materials under or in the rail infrastructure. Archaeological testing would be required at the bridge location and at work locations east of the bridge to determine whether such materials are present.

Alternative 3

Ground disturbance for Alternative 3 includes construction of a 130-foot-long bridge, 108,200 sf of habitat restoration and enhancement, construction of a new pedestrian bridge and picnic viewpoints, and improvement of the remaining lawn. The existing tunnel would be demolished. Although there is more habitat restoration and enhancement than the other two alternatives, it is within essentially the same footprint. The primary difference between Alternative 3 and the other two alternatives is that Alternative 3 has a greater amount of deep ground disturbance for habitat restoration and the new bridge. Testing would be required at the bridge location and at work locations east of the bridge to determine if this alternative would affect archaeological resources.

Potential Impacts

If the tunnel is older than 50 years, it will need to be evaluated to determine its historic significance. If it is historically significant, it will likely be adversely affected under Alternatives 1 and 3. Historical significance of the tunnel may also impact modifications required by Alternative 2. The process of mitigating the adverse effects would depend on the regulatory context, which in turn depends on funding sources and required permits.

Mitigation is also negotiated and cannot be predicted in advance. However, if the tunnel is historically significant, recordation prior to demolition would be a typical form of mitigation.

It is currently unknown whether any significant archaeological materials exist in the Park. Therefore, potential to affect resources must be estimated by comparing the breadth and depth of ground disturbance. In general, the three alternatives have very similar horizontal extents of ground disturbance but varying depths of excavation within the horizontal extents. Alternative 3 has the greatest volume of ground disturbance (excavation) and should be considered the alternative with the greatest potential to impact archaeological resources. It is followed by Alternative 2, then Alternative 1, which has the least potential to affect cultural resources due to the lesser volume of excavation required.

RECOMMENDATIONS

The cultural resources review process will be determined by the regulatory context. Assuming the project will require a permit from the U.S. Army Corps of Engineers, review under Section 106 of the National Historic Preservation Act would be required. It is recommended that an archaeological survey be conducted when an alternative has been selected, and design is sufficiently advanced that the depth and extent of ground disturbance is finalized. The survey should meet standards and guidelines set by the U.S. Army Corps of Engineers, the Washington Department of Archaeology and Historic Preservation, and the Secretary of the Interior.

REFERENCES

Ames, K.M., and H.D.G. Maschner, 1999. *Peoples of the Northwest Coast: Their Archaeology and Prehistory*. Thames and Hudson Ltd. London.

Bourgeois, J., and S.Y. Johnson, 2000. Geologic evidence of earthquakes at the Snohomish Delta, Washington, in the past 1200 years. *Bulletin of the Geological Society of America* 113(4):482-494.

Coman, E.T., and H.M. Gibbs, 1949. *Time, Tide, and Timber: A Century of Pope & Talbot*. Stanford Business Series, Stanford University Press, Stanford, CA.

Debose, A., and M.W. Klungland, 1983. *Soil Survey of Snohomish County Area, Washington*. United States Department of Agriculture, Soil Conservation Service, Washington, DC.

Dees and Associates, 1986. Master Plan Report, Meadowdale Beach County Park. Report on file at Snohomish County Parks & Recreation, Everett, WA.

Easterbrook, D.J., 2003. Cordilleran Ice Sheet Glaciation of the Puget Lowland and Columbia Plateau and Alpine Glaciation of the North Cascade Range, Washington. In *Western Cordillera and Adjacent Areas*, edited by T.W. Swanson, pp. 137-157. The Geological Society of America, Boulder, CO.

Franklin, J.F., and C.T. Dyrness, 1973. *Natural Vegetation of Oregon and Washington*. USDA Forest Service Technical Report PNW-8. Portland, OR.

Galster, R.L., and W.T. Laprade, 1991. Geology of Seattle, Washington, USA. *Bulletin of the Association of Engineering Geologists* 28(3):235-302.

Goodwin, M., and M. Daniels, 2014. Archaeological Survey for Proposed SN4914 Fisher Road Telecommunications Facility, Snohomish County, Washington. Report on file at the Department of Archaeology and Historic Preservation, Olympia, WA.

Heller, P.L., and D.P. Dethier, 1981. Surficial and Environmental Geology of the Lower Baker Valley, Skagit County, Washington. *Northwest Science* 55(2):145-155.

Hilbert, V., J. Miller, and Z. Zahir, 2001. Puget Sound Geography. Original Manuscript from T.T. Waterman, Edited with Additional Material from V. Hilbert, J. Miller, and Z. Zahir. Lushootseed Press. Seattle, WA.

Juell, K., 2006. Archaeological Site Assessment of Sound Transit's Sounder: Everett-to-Seattle Commuter Rail System, King and Snohomish Counties, Washington. Report on file at the Department of Archaeology and Historic Preservation, Olympia, WA.

LeWarne, C., 2008. Edmonds – a thumbnail history. HistoryLink.org Essay 8542. Electronic document accessed March 2015. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=8542

Matson, R.G., and G. Coupland, 1995. *The Prehistory of the Northwest Coast*. Academic Press, London.

Oakley, J., 2005. Everett – a thumbnail history. HistoryLink.org Essay 7397. Electronic document accessed March 2015. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=7397

Ruby, R.H., and J.A. Brown, 1986. *A Guide to the Indian Tribes of the Pacific Northwest*. University of Oklahoma Press, Norman, OK.

Shannon and Wilson, Inc., 2015. *Meadowdale Beach Park Feasibility Study, Geologic Assessment and Sediment Loading, South Snohomish County, Washington*. Report on file at Anchor QEA, LLC, Bellingham, WA.

Suttles, W., 1990. Central Coast Salish. In *Northwest Coast*, edited by W. Suttles, pp. 453-475. *Handbook of North American Indians* Volume 7. Smithsonian Institution, Washington DC.

Thorson, R.M., 1980. Ice-sheet Glaciation of the Puget Lowland, Washington, During the Vashon Stade (late Pleistocene). *Quaternary Research* 13: 303-312.

Villigan, T., 2011. Meadowdale: “One of the most prettily situated hamlets in Snohomish County”. Alderwood Manor News Clippings, Newsletter of the Alderwood Manor Heritage Association. December.

FIGURES

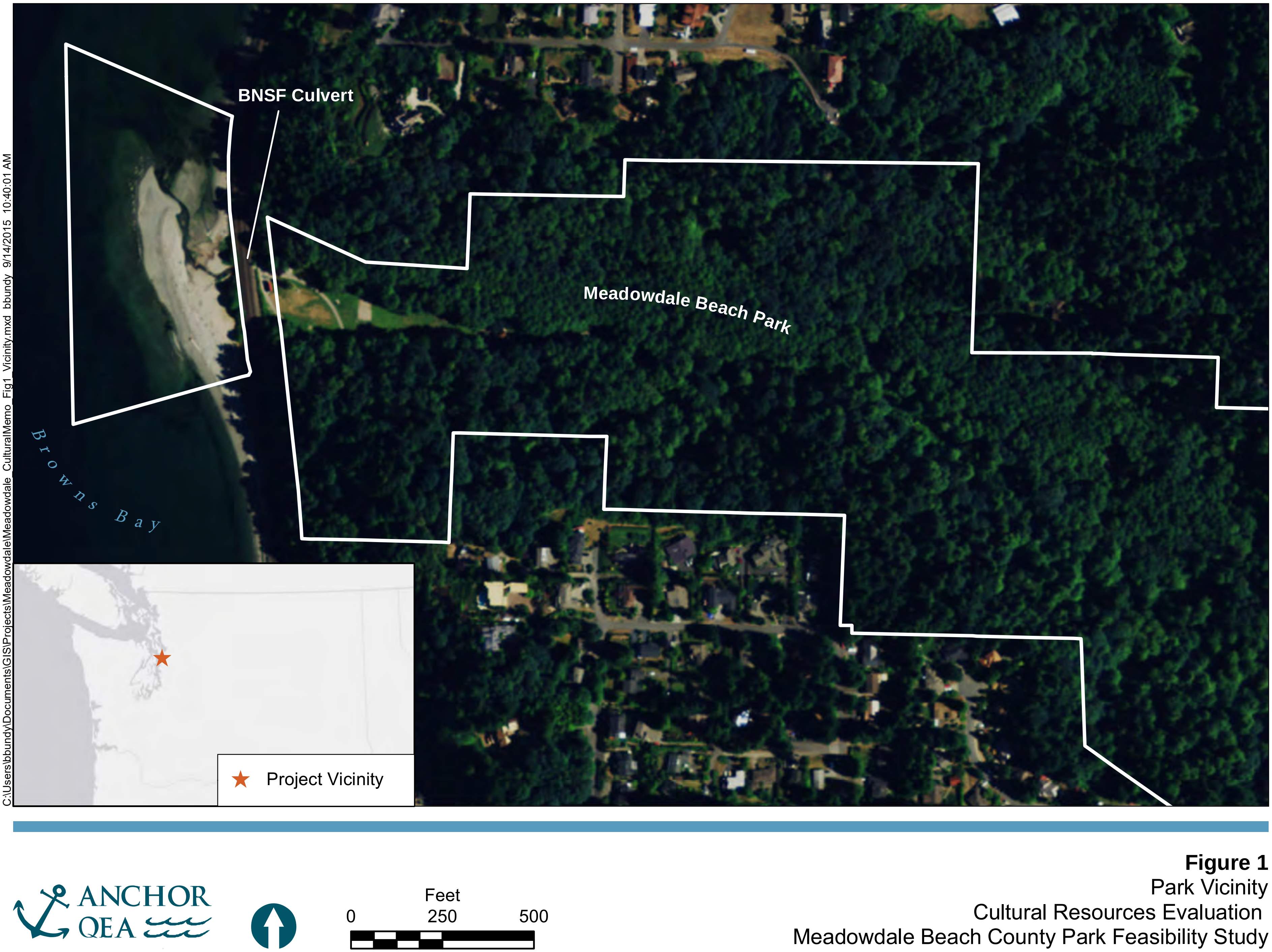


Figure 1
Park Vicinity
Cultural Resources Evaluation
Meadowdale Beach County Park Feasibility Study

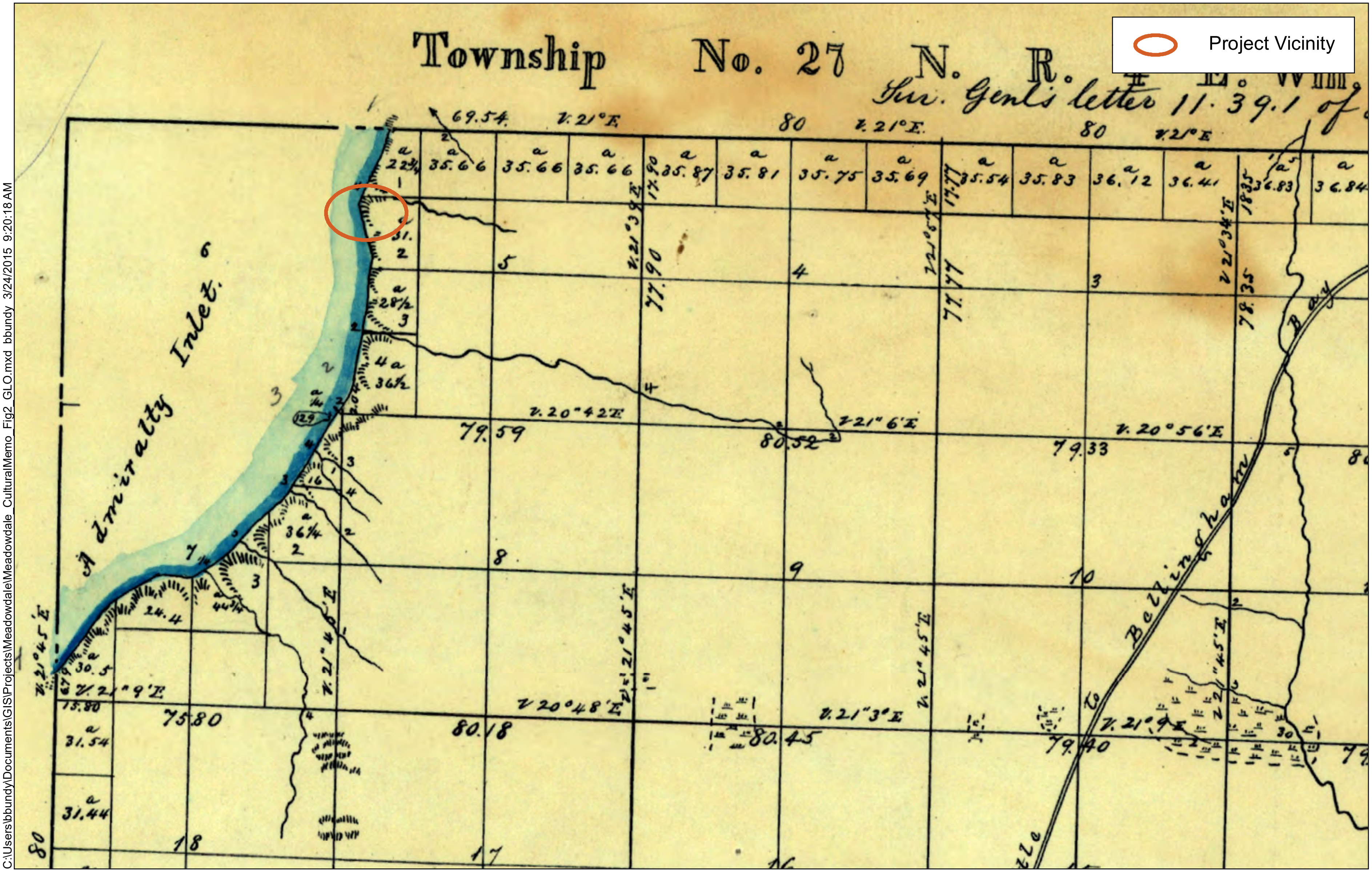


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Figure 2
1859 General Land Office Map
Cultural Resources Evaluation
Meadowdale Beach County Park Feasibility Study

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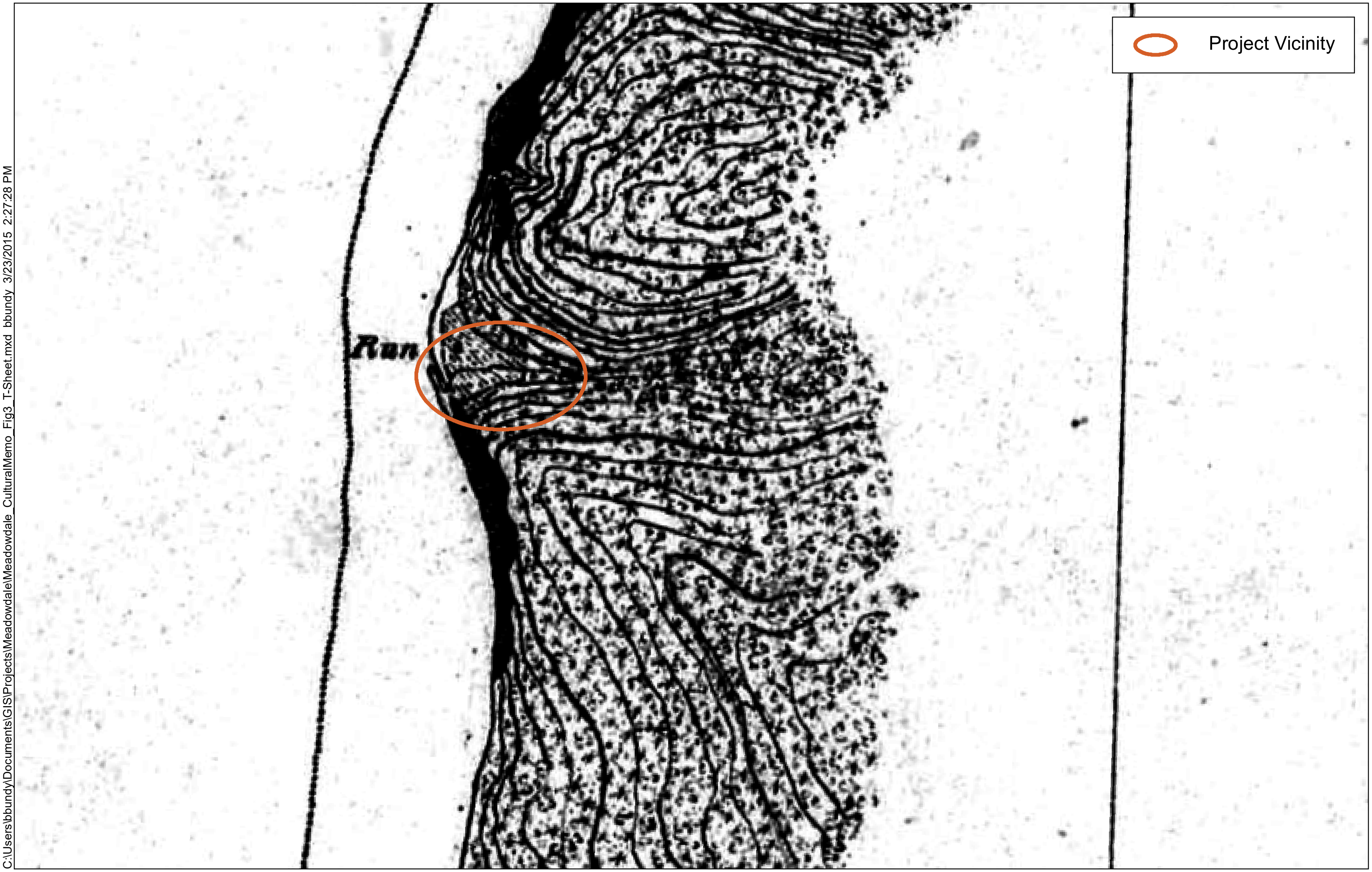

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Figure 3
1872 U.S. Coast Survey T-Sheet
Cultural Resources Evaluation
Meadowdale Beach County Park Feasibility Study

APPENDIX J
PHASE 1 ENVIRONMENTAL EVALUATION

Meadowdale Beach Park
Phase I Environmental Site Assessment
Edmonds, Washington

September 15, 2015

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Excellence. Innovation. Service. Value.

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21-1-22034-001

EXECUTIVE SUMMARY

Shannon & Wilson, Inc. has completed a Phase I Environmental Site Assessment (ESA) for a portion of Meadowdale Beach Park located at 15433 75th Place West in Edmonds, Washington (the Subject Property). This study was conducted on behalf of Anchor QEA in anticipation of potential construction activities on the Subject Property that may require ground disturbance.

The Subject Property is within Meadowdale Beach Park and consists of parkland on the east and a beach on the west that are separated by BNSF Railway Company railroad tracks with an approximately 6-foot-wide by 7-foot-high culvert running east-west underneath. Location and site maps are included as Figures 1 and 2.

The research conducted for this Phase I ESA indicates that the Subject Property was occupied by a country club pool house from at least 1941 until the late 1960s. The property was then converted to a public park and the pool house was demolished and the pool was eventually filled in. Later, a picnic shelter, restroom building, and sand volleyball court were built on the Subject Property.

The surrounding properties are and have been mostly undeveloped park land. A park ranger's residence with a small parking area and maintenance shed were built on the property adjacent to the east of the Subject Property in 1988.

Recognized Environmental Conditions (RECs)

In our opinion, this assessment revealed the presence of one REC on the Subject Property: potential contaminants associated with the presence of railroad tracks on the Subject Property.

Controlled Recognized Environmental Conditions (CRECs)

In our opinion, this assessment revealed no CRECs in connection with the Subject Property.

Historical Recognized Environmental Conditions (HRECs)

In our opinion, this assessment revealed no HRECs in connection with the Subject Property.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (cont.)

TABLE

FIGURES

APPENDICES

PHASE I ENVIRONMENTAL SITE ASSESSMENT
MEADOWDALE BEACH PARK
SHORELINE, WASHINGTON

1.0 INTRODUCTION

Shannon & Wilson, Inc. has completed a Phase I Environmental Site Assessment (ESA) for the area surrounding the existing BNSF Railway Company (BNSF) embankment (excluding the embankment) and park facilities at the lower end of Meadowdale Beach Park in Edmonds, Washington (Figure 1) (the "Subject Property"). The work was conducted for Anchor QEA in accordance with our proposal dated November 26, 2014. Authorization to proceed was received from Mr. Peter Hummel via a signed subconsultant agreement in December 2014.

1.1 Purpose of Phase I Environmental Site Assessment (ESA)

The purpose of a Phase I ESA is to identify, to the extent feasible pursuant to the process described in the ASTM International (ASTM) Practice E1527-13 (Phase I ASTM Standard) (ASTM, 2013), *recognized environmental conditions* (RECs), *controlled RECs* (CRECs), and/or *historical recognized conditions* (HRECs) associated with the site.

The term RECs means:

> The presence or likely presence of hazardous substances or petroleum products in, on or at a property: (1) due to a release to the environment, (2) under conditions indicative of a release to the environment, or (3) under conditions that pose a material threat of a future release to the environment.

The term CREC means:

> A REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls).

The term HREC means:

A past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls).

The terms REC, CREC, and HREC are not intended to include de minimis conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not RECs, CRECs, or HRECs.

The U.S. Environmental Protection Agency (EPA) has determined that the Phase I ASTM Standard is consistent with and meets the requirements for performing All Appropriate Inquiry (AAI) and may be used to comply with federal AAI regulations at 40 Code of Federal Regulations (CFR) Part 312. Shannon & Wilson, Inc. has not determined whether additional inquiry requirements may exist to potentially qualify for similar landowner liability protection under state law.

1.2 Scope of Work

The scope of work included the following subtasks:

- Review of readily available information pertaining to current uses of the Subject Property and their surroundings.
- Review of readily available information from various sources, including city directories, historical maps, and aerial photographs, pertaining to the historical uses of the Subject Property.
- Review of state and federal databases of known and suspected contaminated sites.
- Visual reconnaissance of the Subject Property and cursory reconnaissance of the immediate site vicinity.
- Review of information related to the physical setting of the site.
- Preparation of this report.

The scope of this project did not include an audit of environmental regulatory compliance issues or permits, wetland delineation, or collection and testing of environmental samples, including those for radon gas, lead-based paint, polychlorinated biphenyls, asbestos, mold, soil, surface water, and/or groundwater.

2.0 SITE DESCRIPTION AND PHYSICAL SETTING

2.1 Location and Legal Description

The Subject Property consists of Snohomish County tax parcel 27040500200200 and a portion of 27040500200100 in Edmonds, Washington (Figure 1) in Section 37, Township 27 North, Range 4 East of the Willamette Meridian. The Subject Property is within Meadowdale Beach Park and consists of parkland on the east and a beach on the west that are separated by BNSF railroad tracks with an approximately 6-foot-wide by 7-foot-high culvert running east-west underneath (Figure 2). The culvert is located at the west end of Lund's Gulch, which is a roughly 1.5-mile-long drainage channel oriented west-northwest from uplands to Puget Sound (Figure 1). The Subject Property is part of the park and is undeveloped apart from the culvert/tunnel, man-made paths/trails leading through the park, a picnic shelter, pedestrian bridge, Sanican enclosure, and ADA parking lot.

2.2 Site and Vicinity Characteristics

The Subject Property is located within Meadowdale Beach Park, an approximately 108-acre park located on Puget Sound. Much of the park is located within an east-west running gulch (Lund's Gulch), such that the north and south sides slope down to a channel that outlets to Puget Sound on the west. Contours on the U.S. Geological Survey (USGS) topographic map – Edmunds east Quadrangle (USGS, 1953) indicate that the ground surface elevation is at or near sea level in the vicinity of site area.

3.0 GEOLOGIC AND HYDROGEOLOGIC SETTING

This section describes the general geologic setting of the site vicinity and discusses the subsurface conditions beneath the subject properties and surrounding area, as they relate to the potential for contamination to migrate through the soils and groundwater. The geologic and hydrogeologic summaries below are based on Shannon & Wilson, Inc.'s research for the geologic loading and sediment assessment report for the site (Shannon & Wilson, Inc., 2015).

3.1 Regional and Site Geology

Geologists generally agree that the Puget Sound area was subjected to six or more major glacial events. Each glaciation deposited new sediment and partially eroded previous sediments. During the intervening periods when glacial ice was not present, normal stream processes, wave action, weathering, and landsliding eroded and reworked some of the glacially derived sediment, further complicating the geologic setting.

During the most recent Vashon Stade of the Fraser Glaciation that covered the central Puget Lowland, approximately 18,000 to 16,000 years before present (Porter and Swanson, 1998), the glacial ice is estimated to have been about 3,000 feet thick in the project area (Thorson, 1989). The weight of the glacial ice resulted in compaction of the glacial and nonglacial soils beneath the ice. The glacial and nonglacial deposits are overlain by younger (Holocene Epoch), relatively loose and soft, post-glacial soils that include peat, beach, colluvial, and fill deposits.

Lund's Gulch incises through glacial and non-glacial soils from uplands of greater than 300 feet elevation to Puget Sound along a west-northwest trend in south Snohomish County (Figure 1, Vicinity Map). Meadowdale Beach Park encompasses the lower half of Lund's Gulch.

Lund's Gulch was carved by glacial meltwater after ice from the most recent (Fraser) glaciation retreated and the land was uncovered (Applied Geotechnology, Inc., 1986). During the time of the ice retreat, the steep slopes along the sides of the meltwater channel became destabilized and slid following retreat of the glacial ice sheet and remain largely stable in their position (Applied Geotechnology Inc., 1986). Several of these glacial meltwater channels and slump block benches can be seen with terrain or Light Detection and Ranging mapping in the central Puget Sound region, as seen in Figure 1 along Norma Beach Road and Picnic Point Road.

The upper mile of Lund's Gulch is deeply incised with several smaller gullies, drainages, and seeps flowing into the Gulch. A tributary from the north joins Lund's Gulch within Meadowdale Beach Park. The lower half-mile of Lund's Gulch is a broader valley bottom, but also with steep side slopes.

3.2 Site Hydrogeology

The west end of the site, from approximately the culvert to the west is located at or near sea level, adjacent to Puget Sound. Groundwater at the site is therefore expected to be within one foot of the surface. The east end of the Subject Property is higher in elevation and groundwater is expected to be correspondingly deeper. The groundwater flow direction is expected to be to the west, toward Puget Sound.

However, sudden rises in the water table following heavy rains can cause temporary and local changes, as well as reversals in flow direction.

4.0 SITE HISTORY

The history of land use for the Subject Property was evaluated to identify past uses that might have adversely affected the environmental conditions of the property, primarily through the use and release of potentially hazardous materials. The historical information was obtained by reviewing readily available data from public agencies and library resources.

The following site history is based on a compilation of information obtained from the following resources:

- Washington State Archives, Puget Sound Regional Division, Bellevue, Washington.
- Aerial photographs obtained from Environmental Data Resources (EDR) (1941, 1952, 1968, 1975, 1979, 1980, 1990, 2006, 2009, and 2011).
- Snohomish County Assessor's records from the Snohomish County Online Property Information Interactive Map.
- Cole City Directory (1987, 1992, 1995, 1999, 2003, 2008, and 2013)

Sanborn Fire Insurance Maps and Polk City Directories were requested for the site, but were unavailable.

Table 1 provides a summary of the historical uses of the Subject Property and the adjacent properties based on the compilation of information obtained from the above sources.

4.1 Subject Property History

According to information on the Snohomish County website (Snohomish County, 2015), Meadowdale Beach Park was first homesteaded by John Lund in 1878, but eventually was purchased by the Meadowdale Country Club (MCC). Structures at the MCC included a clubhouse, a swimming pool with bath houses, and a fish hatchery. The MCC closed in the late 1960s, partially due to access road failure. Snohomish County Parks acquired the land in 1968. A fire destroyed the already vandalized clubhouse in 1970 and Snohomish County subsequently filled in the swimming pool because of the safety hazard.

In 1979, the park was closed for public access and use until a safe public and emergency vehicle access road was built. The park was reopened in 1988. The park was closed again in 1996 due to excessive storm damage and re-opened the following year.

The culvert/beach access tunnel was originally constructed by BNSF as a culvert for Lund's Gulch Creek. In 1987 an agreement was made to allow for a shared-use of the tunnel as a culvert and beach access tunnel. The culvert was subsequently modified with a boardwalk, and later with a steel grating, to allow for pedestrian access. Erosion and sedimentation processes within the gulch have significantly increased and continue to worsen becoming a barrier to fish as well as causing flooding within the tunnel.

Based on a review of the aerial photographs, it appears that the Subject Property has been undeveloped apart from a road/path heading to, and the railroad tracks running above, the culvert since at least 1941. A cleared area, which may be a parking lot, is visible adjacent to the east of the culvert in the photographs starting in 1952. Beginning in the 1968 photograph, a building is visible on the east side of the cleared area. This building is not visible in the 1990 photograph, and may not be present in the 1980 photograph, which is of poor resolution. This building was likely the clubhouse, which was demolished in 1970. A new Sanican enclosure that appears to be directly adjacent to the east of the culvert is visible starting with the 1990 photograph. Conditions appear mostly unchanged in the 2006 photograph, apart from the presence of a large rectangular structure/feature to the east of the culvert, in the vicinity of the building formerly located in this area. This feature is also present in the 2009 and 2011 photographs.

4.2 Adjacent Property History

Based on our review of the aerial photographs, the on-land properties adjacent to the Subject Property have been mostly undeveloped and/or part of the park since at least 1941. The parcel adjacent to the east of the Subject Property has been occupied by the park ranger's residence, which uses electric baseboard heaters, since about 1988. The area to the west of the Subject Property is part of Puget Sound.

5.0 INTERVIEW

On February 15, 2015, Shannon & Wilson, Inc.'s representative interviewed Park Ranger Doug Dailer by telephone. Ranger Dailer indicated that he has been the Park Ranger since 1992. Ranger Dailer had no knowledge of any hazardous materials use or storage on the Subject Property. He indicated that motor fuel is stored in a maintenance shed in the ranger's residence area on the property adjacent to the east of the Subject Property and that the residence is hooked up to the City of Edmonds water and sewer service. He knew of no past use of hazardous materials, underground storage tanks (USTs), or aboveground storage tanks (ASTs) at the site, but did say that a swimming pool building was formerly located on the Subject Property in the vicinity of the existing picnic shelter and volley ball courts when the property was owned by a country club.

6.0 SITE RECONNAISSANCE

6.1 Methodology and Limiting Conditions

The objective of the site reconnaissance is to obtain information indicating the likelihood of identifying RECs in connection with the property. A Shannon & Wilson, Inc. representative assessed the site and surrounding area on February 6, 2015, to visually observe the property for evidence of confirmed and potential impacts of hazardous substances or petroleum resulting from historical or current site use. The site visit consisted of observation of the site and the property's periphery. Photographs taken during the site reconnaissance are included in Appendix A.

6.2 General Site Setting

At the time of the reconnaissance, the Subject Property consisted of a park on the east and beach on the west, separated by north-south running railroad tracks. The park area was located in a small ravine and was generally flat with a slight slope towards the west. The surrounding areas to the north and south sloped steeply down to the park. The park area included a maintained grass lawn area with paved paths, a picnic shelter, a sand volleyball court, and a restroom building (Photo A). The areas surrounding this section of the park were wooded. Lund's Gulch drainage ran east-west along the northern end of the park area and discharged through a culvert (Photo B) under the railroad tracks (Photo C) to the beach area. At the time of the reconnaissance, floor of the culvert was covered with running water (Photo D), so it could not be observed, but appeared to consist of metal grating. The beach area on the west side of the railroad tracks consisted of an undeveloped sandy and rock beach with drainage from Lund's Gulch (Photo E).

No hazardous materials use or storage was observed in the Subject Property during this reconnaissance.

6.3 Potable Water Supply and Sewage Disposal System

The Sanican enclosure and a water fountain on the Subject Property are connected to the municipal water supply. According to Ranger Dailer, the bathroom waste system is self-contained and is cleaned out with a vacuum truck on a regular basis. There is no sanitary sewer systems connection to the Subject Property.

6.4 Site Observations

The following sections describe observations made during our site reconnaissance.

6.4.1 Pits, Ponds, and Lagoons

No pits, ponds, or lagoons were observed on the Subject Property.

6.4.2 Septic Systems

No septic systems were observed on the Subject Property.

6.4.3 Stained Soil or Pavement

Stained soil and pavement were not observed on the Subject Property.

6.4.4 Interior Drains and Sumps

No interior drains or sumps were observed in the restroom building.

6.4.5 Stressed Vegetation

No stressed vegetation was observed at the site.

6.4.6 Aboveground and Underground Storage Tanks (USTs)

No evidence of USTs or ASTs was observed on the Subject Property.

6.4.7 Odors

No odors were noted on the site.

6.4.8 Pools of Liquid

No pools of liquid (apart from standing water and water in the Lund's Gulch drainage) were observed on the Subject Property.

6.4.9 Drums or Hazardous Substances/Petroleum Products Containers

No drums or hazardous substances were noted on site.

6.4.10 Unidentified Substance Containers

No unidentified substance containers were observed on the site.

6.4.11 Electrical or Hydraulic Equipment with Polychlorinated Biphenyls

No transformers or other potentially polychlorinated biphenyl-containing equipment were observed on the Subject Property.

6.4.12 Stormwater and Wastewater Discharges

Stormwater runoff from the developed portions of the site would appear to flow toward the west. No wastewater discharges were observed.

6.5 Adjacent and Surrounding Properties Evaluation

Apart from the property adjacent to the east, the adjacent properties were undeveloped park land. The property to the east was part of the park and was occupied by the park ranger's residence (Photos F and G). The ranger's residence consisted of a small house, a shed, and a carport. An AST was observed on this site, but according to Ranger Dailer it is for water storage only. No signs of hazardous materials use or storage were observed on this property.

7.0 RESULTS OF ENVIRONMENTAL RECORDS REVIEW

We subcontracted EDR to conduct a search of the EPA and the Washington Department of Ecology (Ecology) environmental databases that contain information regarding environmental conditions at and near the Subject Property. The EDR report was reviewed for accuracy of site locations and was modified appropriately. The complete EDR report, including figures identifying locations of reportable sites within 1 mile of the Subject Property, is provided on a compact disc and is included in Appendix B.

In addition to the listed sites, EDR compiles a list of historic service stations, repair shops, and dry cleaner sites. Other than the approximate dates of site use, no more information was found. However, releases could have occurred at these sites.

The following three sites within the selected search radii were listed in the local, state, and/or federal databases reviewed:

- Norma Beach Boathouse – located approximately 1,800 feet north of the Subject Property;
- Norma Beach Road – located approximately 1,850 feet north/northeast of the Subject Property; and
- Arbutus Gardens – located approximately 2,440 feet east of the Subject Property.

The Norma Beach Boathouse and Norma Beach Road sites are both located cross-gradient from the Subject Property. Contaminants at these sites are therefore unlikely to migrate onto the Subject Property. Files for these sites were therefore not requested from Ecology for review.

The Arbutus Gardens site is located upgradient of the Subject Property. This site appears only on the "ALLSITES" database, which lists sites of interest to Ecology that do may not appear on other databases. According to the EDR report, this site is listed because it has a construction stormwater permit with no recorded violations. It is therefore unlikely that it would affect the Subject Property, so the file was not requested for review from Ecology.

8.0 DATA GAPS

We have not identified data gaps in the context of our AAI for RECs at the Subject Property.

9.0 SUMMARY OF FINDINGS AND CONCLUSIONS

Based on our site visit and information review, it is the professional opinion of Shannon & Wilson, Inc. that RECs exist for the subject site from an off-site source. Specific findings and conclusions regarding on- and off-site environmental risks are discussed in the following sections.

9.1 Subject Property

The Subject Property has been mostly vacant and undeveloped since the early 1900s. From at least 1941 until the late 1960s when the park was owned by a country club, it was occupied by a pool house that contained an Olympic-sized swimming pool. After the country club closed down, the property was converted to a park, the pool house was demolished, and the pool was filled in due to safety concerns. A picnic shelter, restroom building, and sand volleyball court were subsequently constructed on the site. No RECs associated with these past site uses were identified.

9.2 Potential Off-site Sources

The parcels adjacent to the Subject Property are mostly occupied by undeveloped park land. A portion of property to the east has been occupied by the park ranger's residence since 1988. Small quantities of fuel are stored at the ranger's residence, but there have been no known spills at this site. There are therefore no known RECs associated with the adjacent properties.

BNSF railroad tracks are located within a right-of-way owned by BNSF that runs north-south across the western end of the Subject Property. Photographic evidence indicates that the tracks have been present since at least 1941, but are known to have been built in the late 1800s. Railroad contaminants of concern include polycyclic aromatic hydrocarbons associated with creosote-treated railroad ties or buried track superstructure, petroleum hydrocarbons due to lube oil leaks, and herbicides used to keep vegetation clear of the tracks. In addition, fill materials used during the construction and maintenance of the railroad tracks may have contained hazardous materials. These railroad tracks therefore are considered a REC. This REC may require the segregation and disposal of material excavated and removed from the site.

10.0 LIMITATIONS, UNCERTAINTY, AND RISK

This Phase I ESA was conducted to render a professional opinion about the likelihood of regulated contaminants being present on, in, or beneath the site at the time services were conducted. No matter how thorough a Phase I ESA study may be, findings derived from its conduct are limited, and Shannon & Wilson, Inc. cannot know or state for an absolute fact that a site is unaffected by reportable quantities of regulated contaminants. Furthermore, even if Shannon & Wilson, Inc. believes that reportable quantities of regulated contaminants are not present, Anchor QEA still bears the risk that such contaminants may be present or may migrate to the site after the study is complete.

Shannon & Wilson, Inc. has reviewed historical records, conducted interviews with the property owner, and conducted an on-site visual inspection of the Subject Property. We have examined and relied on documents referenced in the report and on oral statements made by certain individuals. Shannon & Wilson, Inc. has not conducted an independent examination of the facts contained in referenced materials and statements. We have assumed that these documents are genuine, and that the information provided in these documents and statements is true and accurate. We have no knowledge or indication to the contrary unless otherwise stated in the body of the report.

Data generated from the site reconnaissance reflect that which can be reasonably inferred or is obvious by direct visual observation. Shannon & Wilson, Inc. assumes no responsibility for identifying characteristics of the Subject Property that were not readily identifiable by visual reconnaissance at the time of our site visit.

Shannon & Wilson, Inc. has prepared this report in a professional manner, using that level of skill and care normally exercised for similar projects under similar conditions by reputable and competent environmental consultants currently practicing in the area, and in accordance with the terms and conditions set forth in our contract, and our proposal dated August 9, 2013. Shannon & Wilson, Inc. is not responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the report was prepared. We also note that the facts and conditions referenced in this report may change over time, and that the conclusions set forth here are applicable to the facts and conditions as described only at the time of this report. Conclusions were made within the operative constraints of the scope, budget, and schedule for this project. We believe that the conditions stated here are factual, but no guarantee is made or implied.

This report is for the exclusive use of Anchor QEA and its representatives. Shannon & Wilson, Inc. has prepared Appendix C, “Important Information About Your Environmental Site Assessment/Evaluation Report,” to help you and others understand the use and limitations of our reports.

12.0 CERTIFICATIONS, SIGNATURES, AND CREDENTIALS

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in the CFR Title 40, Part 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property.

This ESA was performed by:

Scott W. Gaulke, P.E, L.H.G.
Vice President

Mr. Scott W. Gaulke, a Vice President at Shannon & Wilson, Inc., prepared this Phase I ESA. Mr. Gaulke is a Professional Engineer with over 25 years of experience conducting Phase I ESAs and other environmental assessments.

CMJ:SWG/cmj

13.0 REFERENCES

Applied Geotechnology, Inc., 1986: available: https://fortress.wa.gov/dnr/geology/?Theme=subsurf, Borehole ID 60442, Document ID10996, accessed 11/2014.

ASTM International (ASTM), 2013, Standard practice for environmental site assessments: phase I environmental site assessment process: West Conshohocken, Penn, ASTM International, standard E1527-05, 35 p.

Porter, S.C., and Swanson, T.W., 1998, Radiocarbon age constraints on rates of advance and retreat of the Puget lobe of the Cordilleran Ice Sheet during the last glaciations: Quaternary Research, v. 50, p. 205-213.

Shannon & Wilson, Inc., 2015, Draft letter report to Ms. Kathy Ketteridge, Anchor QEA, LLC, Re: Meadowdale Beach Park Feasibility Study, Geologic Assessment and Sediment Loading, South Snohomish County, Washington, Seattle, Wash., January 23.

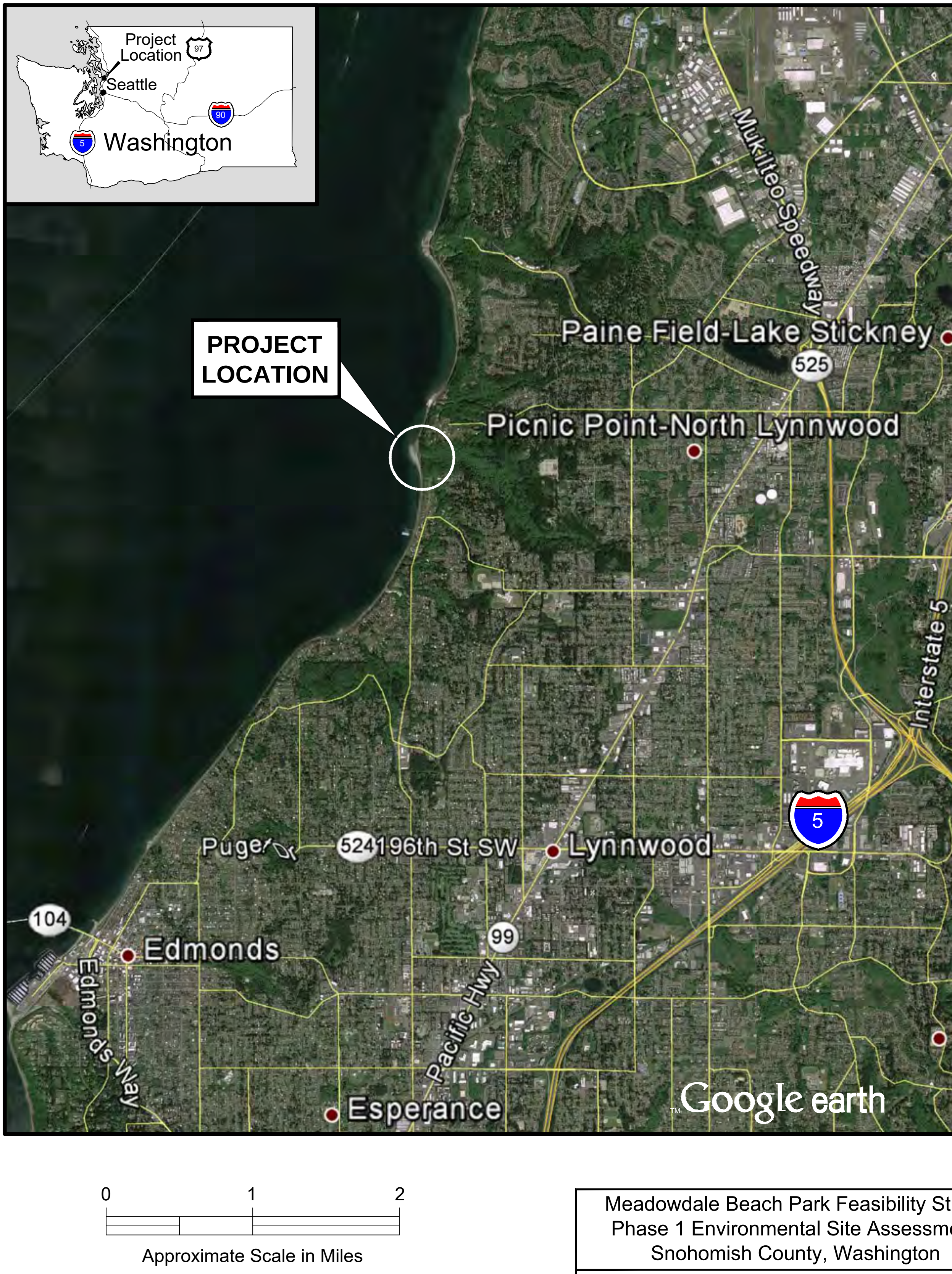
Snohomish County, 2015, Meadowdale Beach Park: available: http://snohomishcountywa.gov/Facilities/Facility/Details/Meadowdale-Beach-Park-56

Thorson, R.M., 1989, Glacio-isostatic response of the Puget Sound area, Washington: Geological Society of American Bulletin, v. 101, no. 9, p. 1,163-1,174.

U.S. Geological Survey (USGS), 1953, revised 1968, Edmonds east quadrangle, Washington 7.5 minute series (topographic): Denver, Colorado, scale 1:24,000.

Table 1
Summary of Site and Surrounding Properties Historical Uses

Parcel Location	Tax Parcel	Site Address	Tax Assessor	Aerial Photo	Recognized Environmental Condition?
Subject Property	27040500200100	15433 75th Place West	Park	1941: Site appears somewhat less forested than surrounding area, otherwise undeveloped except for railroad tracks over culvert 1952: Similar to 1941 with cleared area or building at south side of site. 1968: Same as 1952 with building at south side of site. 1975: Poor quality photo. Site appears to be similar to 1962. 1979: Similar to 1975, building on south side of site is gone. 1980: Similar to 1979. 1990: Site is more forested,current restroom building and picnic shelter appear to be present. 2006: Similar to 1990 with new sand volleyball court. 2009: Similar to as 2006. 2011: Similar to 2009.	Yes - railroad tracks on site.
	27040500200200	Unknown	Beach	1941 - 2011: Beach	
Adjacent West, Northwest, & Southwest	None	None	None	1941 - 2011: Puget Sound	No - These areas are portions of Puget Sound
Adjacent Northeast	00500900002400	Unknown	Undeveloped land	1941 - 2011: Undeveloped	No - Properties appear to be forested/undeveloped with no indication of hazardous materials use or storage.
	00500900002301	Unknown	Undeveloped land	1941 - 2011: Undeveloped	
	00500900001603	Unknown	No information	1941 - 2011: Undeveloped	
	00500900002000	Unknown	Undeveloped land	1941 - 2011: Undeveloped	
	00500900001901	Unknown	Undeveloped land	1941 - 2011: Undeveloped	
Adjacent North	00500900001601	Unknown	Undeveloped land	1941 - 2011: Undeveloped	No - Properties appear to be forested/undeveloped with no indication of hazardous materials use or storage
	00500900001602	Unknown	Undeveloped land	1941 - 2011: Undeveloped	
Adjacent East	27040500200100	15433 75th Place West	Park	1941: Site appears somewhat less forested than surrounding area.	No - No indication of hazardous materials use or storage.
				1952: Similar to 1941.	
				1968: Building located near east end of proiperty. There appears to be a small lake/pond to the east of the building.	
				1975: Poor quality photo. Site appears to be similar to 1962.	
				1979: Building and lake/pond are gone.	
				1980 - 2011 similar to 1979 with new Park Ranger's residence starting in 1990.	
Adjacent South & Southeast	00500900000500	Unknown	Undeveloped land	1941 - 2011: Undeveloped	No - Properties appear to be forested/undeveloped with no indication of hazardous materials use or storage



NOTE

Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth ™ Mapping Service.

Meadowdale Beach Park Feasibility Study Phase 1 Environmental Site Assessment Snohomish County, Washington	
VICINITY MAP February 2015 21-1-22034-001	
SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS	**FIG. 1**

Filename: J:\211\22034-001\21-1-22034-001 Fig 1.dwg Date: 02-10-2015 Login: sac

Filename: J:\211\22034-001\21-1-22034-001 Fig 2.dwg Date: 02-17-2015 Login: sac

0 200 400

Approximate Scale in Feet

NOTE

Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth ™ Mapping Service.

Meadowdale Beach Park Feasibility Study
Phase 1 Environmental Site Assessment
Snohomish County, Washington

SITE AND SURROUNDING PROPERTIES

February 2015 21-1-22034-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

FIG. 2

APPENDIX A

SITE PHOTOGRAPHS

Photo A: Park area of subject property with picnic shelter, restroom building, and sand volleyball court.

Photo B: Culvert beneath railroad tracks.

September 2015
21-1-22034-001

Appendix A
Sheet 1 of 4

Photo C: Railroad tracks separating east and west portions of subject property.

Photo D: Culvert with water covering floor.

Photo E: Beach area on west side of railroad tracks with drainage from Lund's Gulch.

Photo F: East facing view of ranger's residence.

Photo G: South facing view of ranger's residence with shed and carport.

APPENDIX B

ENVIRONMENTAL DATA RESOURCES, INC. (EDR) REPORT

Meadowdale Park
6026 156th St SW
Edmonds, WA 98026

Inquiry Number: 4168089.2s
December 23, 2014

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

6026 156TH ST SW
SNOHOMISH County, WA 98026

COORDINATES

Latitude (North):	47.8642000 - 47˚ 51' 51.12''
Longitude (West):	122.3328000 - 122˚ 19' 58.08''
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	549902.1
UTM Y (Meters):	5301203.5
Elevation:	61 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	47122-G3 EDMONDS EAST, WA
Most Recent Revision:	1981
North Map:	47122-H3 MUKILTEO, WA
Most Recent Revision:	1978

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20110826
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL - National Priority List

EXECUTIVE SUMMARY

Proposed NPL - - - - Proposed National Priority List Sites
NPL LIENS - - - - Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL - - - - National Priority List Deletions

Federal CERCLIS list

CERCLIS - - - - Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY - - - - Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP - - - - CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS - - - - Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF - - - - RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG - - - - RCRA - Large Quantity Generators
RCRA-SQG - - - - RCRA - Small Quantity Generators
RCRA-CESQG - - - - RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS - - - - Engineering Controls Sites List
US INST CONTROL - - - - Sites with Institutional Controls
LUCIS - - - - Land Use Control Information System

Federal ERNS list

ERNS - - - - Emergency Response Notification System

State- and tribal - equivalent NPL

HSL - - - - Hazardous Sites List

State- and tribal - equivalent CERCLIS

CSCSL - - - - Confirmed and Suspected Contaminated Sites List

State and tribal landfill and/or solid waste disposal site lists

SWF/LF - - - - Solid Waste Facility Database

State and tribal leaking storage tank lists

LUST - - - - Leaking Underground Storage Tanks Site List

INDIAN LUST Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

AST Aboveground Storage Tank Locations
INDIAN UST Underground Storage Tanks on Indian Land
FEMA UST Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL Institutional Control Site List

State and tribal voluntary cleanup sites

ICR Independent Cleanup Reports
VCP Voluntary Cleanup Program Sites
INDIAN VCP Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS Brownfields Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

ODI Open Dump Inventory
DEBRIS REGION 9 Torres Martinez Reservation Illegal Dump Site Locations
SWTIRE Solid Waste Tire Facilities
SWRCY Recycling Facility List
INDIAN ODI Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL Clandestine Drug Labs
CSCSL NFA Confirmed & Contaminated Sites - No Further Action
CDL Clandestine Drug Lab Contaminated Site List
HIST CDL List of Sites Contaminated by Clandestine Drug Labs
US HIST CDL National Clandestine Laboratory Register

Local Land Records

LIENS 2 CERCLA Lien Information

Records of Emergency Release Reports

HMIRS Hazardous Materials Information Reporting System
SPILLS Reported Spills
SPILLS 90 SPILLS 90 data from FirstSearch

Other Ascertainable Records

DOT OPS Incident and Accident Data

EXECUTIVE SUMMARY

DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
US MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
RMP	Risk Management Plans
UIC	Underground Injection Wells Listing
MANIFEST	Hazardous Waste Manifest Data
DRYCLEANERS	Drycleaner List
NPDES	Water Quality Permit System Data
AIRS	Washington Emissions Data System
Inactive Drycleaners	Inactive Drycleaners
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
PRP	Potentially Responsible Parties
2020 COR ACTION	2020 Corrective Action Program List
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH	Coal Ash Disposal Site Listing
Financial Assurance	Financial Assurance Information Listing
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants
EDR US Hist Auto Stat	EDR Exclusive Historic Gas Stations
EDR US Hist Cleaners	EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF	Recovered Government Archive Solid Waste Facilities List
RGA LUST	Recovered Government Archive Leaking Underground Storage Tank

EXECUTIVE SUMMARY

RGA HWS - - - - - - - - - - - - - - - - - - - Recovered Government Archive State Hazardous Waste Facilities List

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Ecology's Statewide UST Site/Tank Report.

A review of the UST list, as provided by EDR, and dated 09/29/2014 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORMA BEACH BOATHOUSE	***14725 NORMA BEACH RD***	***NNE 0 - 1/8 (0.055 mi.)***	***1***	***8***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

ALLSITES: Information on facilities and sites of interest to the Department of Ecology.

A review of the ALLSITES list, as provided by EDR, and dated 08/06/2014 has revealed that there are 2 ALLSITES sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NORMA BEACH ROAD	*7200 NORMA BEACH RD*	*ENE 0 - 1/8 (0.102 mi.)*	*2*	*9*

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORMA BEACH BOATHOUSE	***14725 NORMA BEACH RD***	***NNE 0 - 1/8 (0.055 mi.)***	***1***	***8***

EXECUTIVE SUMMARY

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

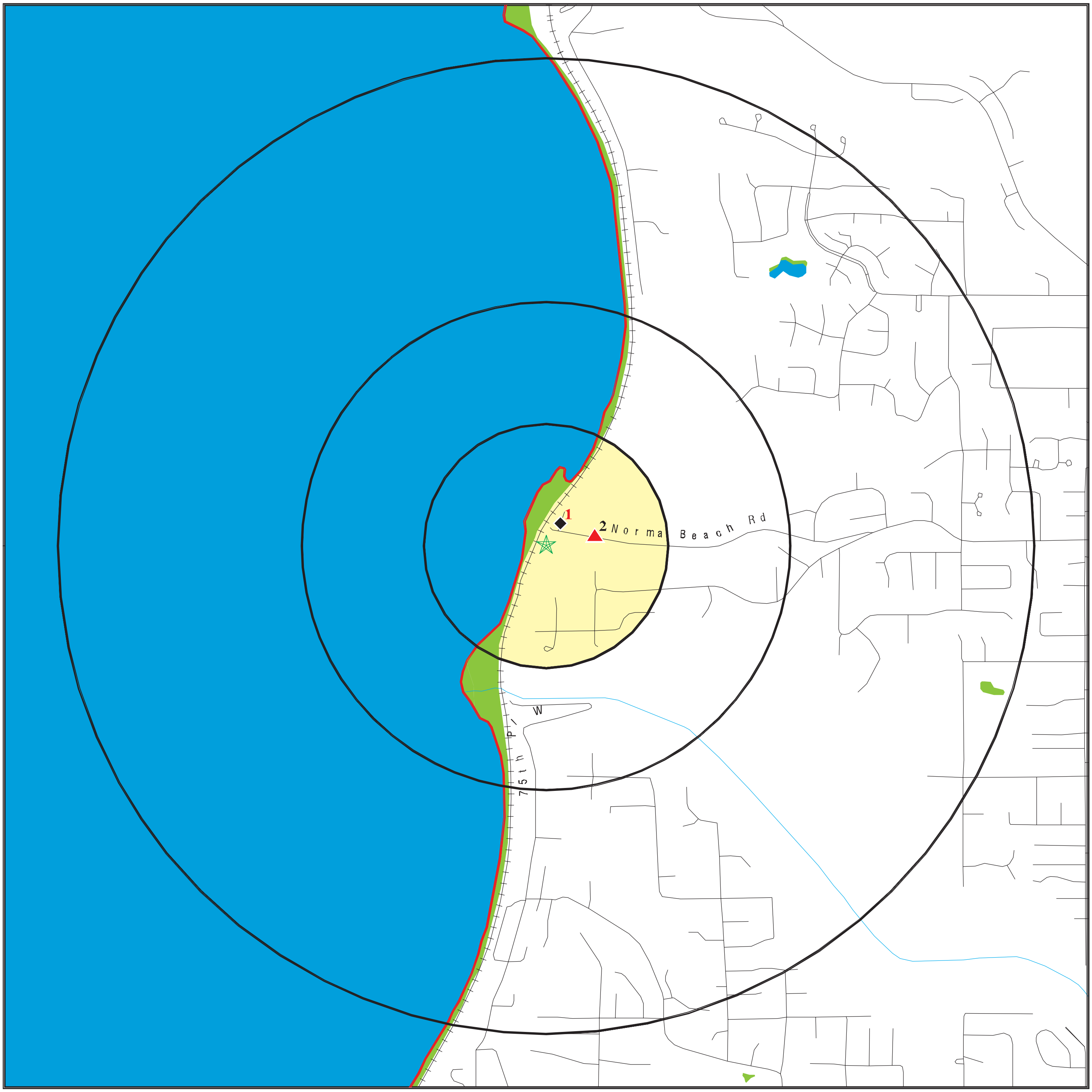
A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 06/10/2014 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NORMA BEACH ROAD	***7200 NORMA BEACH RD***	***ENE 0 - 1/8 (0.102 mi.)***	***2***	***9***

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4168089.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites

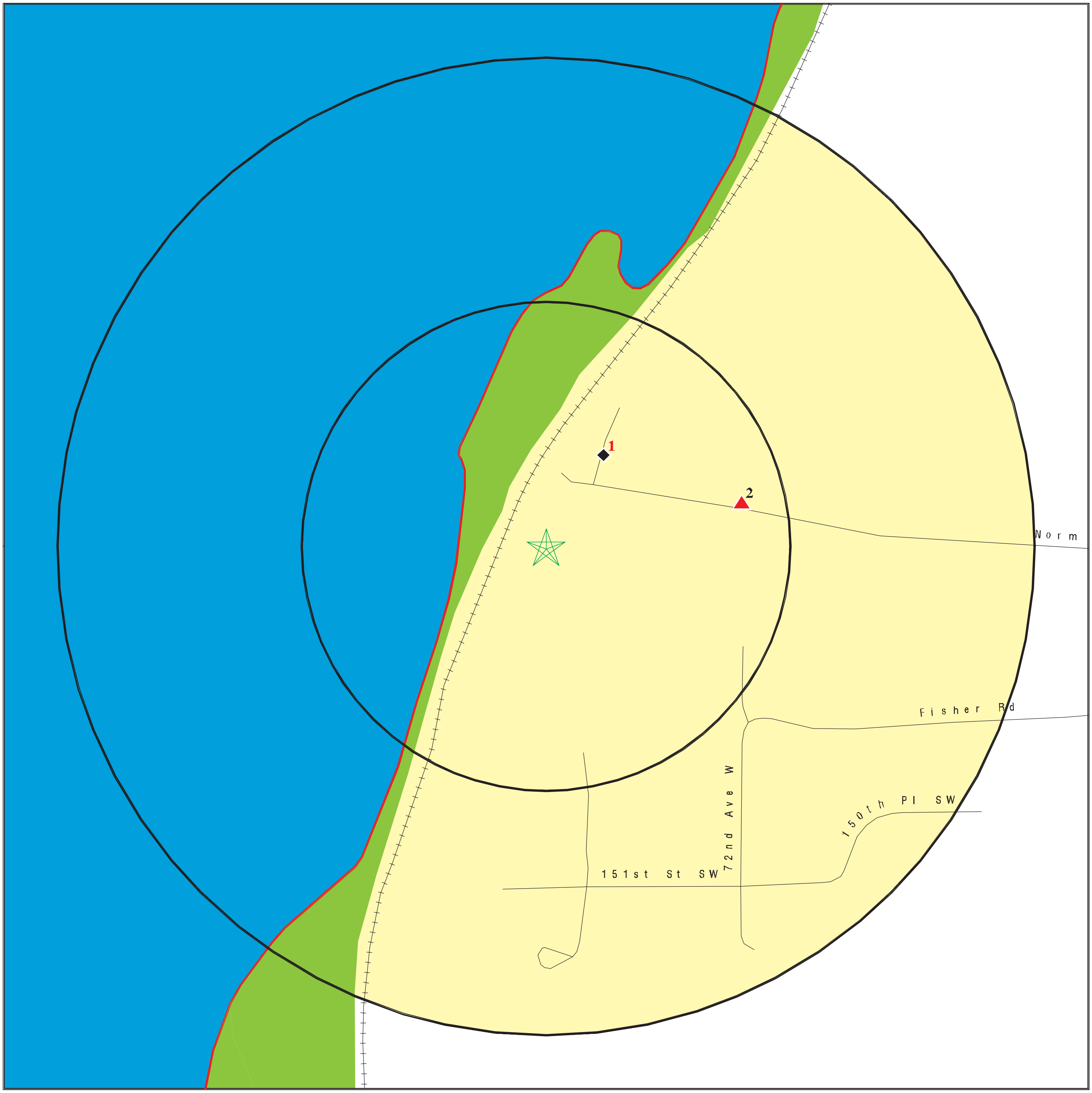
0 1/4 1/2 1 Miles

- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Meadowdale Park ADDRESS: 6026 156th St SW Edmonds WA 98026 LAT/LONG: 47.8642 / 122.3328	CLIENT: Shannon & Wilson, Inc. CONTACT: Cody Johnson INQUIRY #: 4168089.2s DATE: December 23, 2014 1:11 pm

DETAIL MAP - 4168089.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Meadowdale Park ADDRESS: 6026 156th St SW Edmonds WA 98026 LAT/LONG: 47.8642 / 122.3328	CLIENT: Shannon & Wilson, Inc. CONTACT: Cody Johnson INQUIRY #: 4168089.2s DATE: December 23, 2014 1:11 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
HSL	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
CSCSL	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST	0.250		1	0	NR	NR	NR	1
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
ICR	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
SWTIRE	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
ALLSITES	0.500		2	0	0	NR	NR	2
CSCSL NFA	0.500		0	0	0	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
HIST CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		1	0	NR	NR	NR	1

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
MANIFEST	0.250		0	0	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
Inactive Drycleaners	0.250		0	0	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LF	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LUST	TP		NR	NR	NR	NR	NR	0
RGA HWS	TP		NR	NR	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1 **NNE** **< 1/8** **0.055 mi.** **291 ft.**	**NORMA BEACH BOATHOUSE** **14725 NORMA BEACH RD** **EDMONDS, WA 98026**	**ALLSITES** **UST**	**U003028998** **N/A**

Relative:
Lower

Actual:
30 ft.

ALLSITES:

Facility Id:	59636524
Latitude:	47.863944
Longitude:	-122.32208
Ecology Interest Type Code:	UST
Facility ID:	59636524
Facility Company:	NORMA BEACH BOATHOUSE
Interaction:	I
Interaction 1:	UST
Interaction 2:	Underground Storage Tank
Ecology Program:	TOXICS
Program Data:	UST
Facility Alt.:	Not reported
Program ID:	97272
Date Interaction:	6/8/1998 0:00
Date Interaction 3:	5/3/2000 0:00

UST:

Facility ID:	59636524
Site Id:	97272
UBI:	6010368360010002
Phone Number:	2067430178
Decimal Latitude:	47.863944
Decimal Longitude:	-122.322085

Tank Name:	1
Tag Number:	Not reported
Tank Status:	Removed
Tank Status Date:	08/06/1996
Tank Install Date:	00/31/1964
Tank Closure Date:	Not reported
Capacity Range:	Not reported
Tank Permit Expiration Date:	Not reported
Tank Upgrade Date:	Not reported
Tank Spill Prevention:	Not reported
Tank Overfill Prevention:	Not reported
Tank Material:	Steel
Tank Construction:	Single Wall Tank
Tank Tightness Test:	Not reported
Tank Corrosion Protection:	Sacrificial Anode
Tank Manifold:	Not reported
Tank Release Detection:	Not reported
Tank SFC Type:	Not reported
Pipe Material:	Steel
Pipe Construction:	Not reported
Pipe Primary Release Detection:	Not reported
Pipe Second Release Detection:	Not reported
Pipe Corrosion Protection:	Not reported
Pipe Pumping System:	Not reported
Responsible Unit:	NORTHWEST
Dispencer/Pump SFC Type:	Not reported

Map ID / Direction / Distance / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
2 **ENE** **< 1/8** **0.102 mi.** **541 ft.**	**NORMA BEACH ROAD** **7200 NORMA BEACH RD** **LYNNWOOD, WA 98036**	**RCRA NonGen / NLR** **FINDS** **ALLSITES**	**1000199598** **WAD980984546**

Relative:
Higher

Actual:
79 ft.

RCRA NonGen / NLR:

Date form received by agency:	07/01/1986
Facility name:	NORMA BEACH ROAD
Facility address:	7200 NORMA BEACH RD LYNNWOOD, WA 98036
EPA ID:	WAD980984546
Mailing address:	4350 150TH AVE NE REDMOND, WA 98052-5301
Contact:	WA ECY WA ECY
Contact address:	4350 150TH AVE NE REDMOND, WA 98052-5301
Contact country:	US
Contact telephone:	(000)000-0000
Contact email:	Not reported
EPA Region:	10
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	WA ECY W
Owner/operator address:	7200 NORMA BCH RD LYNNWOOD, WA 98036
Owner/operator country:	US
Owner/operator telephone:	(000)000-0000
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	05/02/1996
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Violation Status: No violations found

FINDS:

Registry ID: 110005338599

Environmental Interest/Information System

NORMA BEACH ROAD (Continued) **1000199598**

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ALLSITES:

Facility Id:	64368186
Latitude:	47.81065
Longitude:	-122.29735
Ecology Interest Type Code:	HWG
Facility ID:	64368186
Facility Company:	Norma Beach Road
Interaction:	I
Interaction 1:	HWG
Interaction 2:	Hazardous Waste Generator
Ecology Program:	HAZWASTE
Program Data:	TURBOWASTE
Facility Alt.:	Not reported
Program ID:	WAD980984546
Date Interaction:	7/1/1986 0:00
Date Interaction 3:	12/31/1991 0:00

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/08/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 40

Source: EPA
Telephone: N/A
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/08/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 40

Source: EPA
Telephone: N/A
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/08/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 40

Source: EPA
Telephone: N/A
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 11/24/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/21/2014
Date Data Arrived at EDR: 10/07/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 10/07/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 11/24/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 12/03/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 09/18/2014
Date Data Arrived at EDR: 09/19/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 12/03/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 08/29/2014
Date Data Arrived at EDR: 10/09/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 11

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/17/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 09/30/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 37

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/30/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

State- and tribal - equivalent NPL

HSL: Hazardous Sites List

The Hazardous Sites List is a subset of the CSCSL Report. It includes sites which have been assessed and ranked using the Washington Ranking Method (WARM).

Date of Government Version: 08/27/2014
Date Data Arrived at EDR: 09/16/2014
Date Made Active in Reports: 10/13/2014
Number of Days to Update: 27

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 12/09/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Semi-Annually

State- and tribal - equivalent CERCLIS

CSCSL: Confirmed and Suspected Contaminated Sites List

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 10/21/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 10/27/2014
Number of Days to Update: 4

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 10/23/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facility Database

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 12/01/2014
Date Data Arrived at EDR: 12/12/2014
Date Made Active in Reports: 12/22/2014
Number of Days to Update: 10

Source: Department of Ecology
Telephone: 360-407-6132
Last EDR Contact: 12/08/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tanks Site List

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/18/2014
Date Data Arrived at EDR: 08/22/2014
Date Made Active in Reports: 08/29/2014
Number of Days to Update: 7

Source: Department of Ecology
Telephone: 360-407-7183
Last EDR Contact: 11/20/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 184

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/31/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land

Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 11/03/2014
Date Data Arrived at EDR: 11/05/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 12

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/20/2014
Date Data Arrived at EDR: 06/10/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 73

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 11/04/2014
Date Data Arrived at EDR: 11/07/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 10

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 05/22/2014
Date Data Arrived at EDR: 08/22/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 27

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/06/2014
Date Data Arrived at EDR: 10/29/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 19

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 07/30/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 10

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Semi-Annually

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST’s are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 09/30/2014
Date Made Active in Reports: 10/13/2014
Number of Days to Update: 13

Source: Department of Ecology
Telephone: 360-407-7183
Last EDR Contact: 11/14/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Quarterly

AST: Aboveground Storage Tank Locations

A listing of aboveground storage tank locations regulated by the Department of Ecology's Spill Prevention, Preparedness and Response Program.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 05/06/2014
Date Made Active in Reports: 06/04/2014
Number of Days to Update: 29

Source: Department of Ecology
Telephone: 360-407-7562
Last EDR Contact: 11/03/2014
Next Scheduled EDR Contact: 02/16/2015
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/14/2014
Date Data Arrived at EDR: 08/15/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 7

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 11/04/2014
Date Data Arrived at EDR: 11/07/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 10

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 08/20/2014
Date Data Arrived at EDR: 08/22/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 27

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/06/2014
Date Data Arrived at EDR: 10/29/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 8

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/03/2014
Date Data Arrived at EDR: 11/05/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 12

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 07/30/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 08/22/2014
Number of Days to Update: 10

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 01/27/2014
Number of Days to Update: 271

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/31/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/20/2014
Date Data Arrived at EDR: 06/10/2014
Date Made Active in Reports: 08/15/2014
Number of Days to Update: 66

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Quarterly

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/10/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Institutional Control Site List

Sites that have institutional controls.

Date of Government Version: 10/21/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 10/27/2014
Number of Days to Update: 4

Source: Department of Ecology
Telephone: 360-407-7170
Last EDR Contact: 10/23/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/01/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 36

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

ICR: Independent Cleanup Reports

These are remedial action reports Ecology has received from either the owner or operator of the sites. These actions have been conducted without department oversight or approval and are not under an order or decree. This database is no longer updated by the Department of Ecology.

Date of Government Version: 12/01/2002
Date Data Arrived at EDR: 01/03/2003
Date Made Active in Reports: 01/22/2003
Number of Days to Update: 19

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 08/10/2009
Next Scheduled EDR Contact: 11/09/2009
Data Release Frequency: No Update Planned

VCP: Voluntary Cleanup Program Sites

Sites that have entered either the Voluntary Cleanup Program or its predecessor Independent Remedial Action Program.

Date of Government Version: 10/21/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 10/27/2014
Number of Days to Update: 4

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 10/23/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites Listing

A listing of brownfields sites included in the Confirmed & Suspected Sites Listing. Brownfields are abandoned, idle or underused commercial or industrial properties, where the expansion or redevelopment is hindered by real or perceived contamination. Brownfields vary in size, location, age, and past use -- they can be anything from a five-hundred acre automobile assembly plant to a small, abandoned corner gas station.

Date of Government Version: 10/21/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 10/27/2014
Number of Days to Update: 4

Source: Department of Ecology
Telephone: 360-725-4030
Last EDR Contact: 10/23/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 09/22/2014
Date Data Arrived at EDR: 09/23/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/22/2014
Next Scheduled EDR Contact: 04/06/2015
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 10/24/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: No Update Planned

SWRCY: Recycling Facility List

A llisting of recycling center locations.

Date of Government Version: 07/14/2014
Date Data Arrived at EDR: 07/31/2014
Date Made Active in Reports: 08/29/2014
Number of Days to Update: 29

Source: Department of Ecology
Telephone: 360-407-6105
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

SWTIRE: Solid Waste Tire Facilities

This study identified sites statewide with unauthorized accumulations of scrap tires.

Date of Government Version: 11/01/2005
Date Data Arrived at EDR: 03/16/2006
Date Made Active in Reports: 04/13/2006
Number of Days to Update: 28

Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 12/08/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 10/29/2014
Next Scheduled EDR Contact: 02/16/2015
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/25/2014
Date Data Arrived at EDR: 09/09/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 41

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/25/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Quarterly

ALLSITES: Facility/Site Identification System Listing

Information on facilities and sites of interest to the Department of Ecology.

Date of Government Version: 08/06/2014
Date Data Arrived at EDR: 08/07/2014
Date Made Active in Reports: 08/27/2014
Number of Days to Update: 20

Source: Department of Ecology
Telephone: 360-407-6423
Last EDR Contact: 11/03/2014
Next Scheduled EDR Contact: 02/16/2015
Data Release Frequency: Quarterly

CSCSL NFA: Confirmed and Contaminated Sites - No Further Action

This report contains information about sites that are undergoing cleanup and sites that are awaiting further investigation and/or cleanup. Sites on the Hazardous Sites List (see above) are included in this data set.

Date of Government Version: 10/21/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 10/27/2014
Number of Days to Update: 4

Source: Department of Ecology
Telephone: 360-407-7170
Last EDR Contact: 10/21/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Semi-Annually

CDL: Clandestine Drug Lab Contaminated Site List

Illegal methamphetamine labs use hazardous chemicals that create public health hazards. Chemicals and residues can cause burns, respiratory and neurological damage, and death. Biological hazards associated with intravenous needles, feces, and blood also pose health risks.

Date of Government Version: 11/09/2014
Date Data Arrived at EDR: 11/24/2014
Date Made Active in Reports: 12/22/2014
Number of Days to Update: 28

Source: Department of Health
Telephone: 360-236-3380
Last EDR Contact: 11/10/2014
Next Scheduled EDR Contact: 02/23/2015
Data Release Frequency: Varies

HIST CDL: List of Sites Contaminated by Clandestine Drug Labs

This listing of contaminated sites by Clandestine Drug Labs includes non-remediated properties. The current CDL listing does not. This listing is no longer updated by the state agency.

Date of Government Version: 02/08/2007
Date Data Arrived at EDR: 06/26/2007
Date Made Active in Reports: 07/19/2007
Number of Days to Update: 23

Source: Department of Health
Telephone: 360-236-3381
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/25/2014
Date Data Arrived at EDR: 09/09/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 41

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/25/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/30/2014
Date Data Arrived at EDR: 10/01/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 36

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 10/01/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

SPILLS: Reported Spills

Spills reported to the Spill Prevention, Preparedness and Response Division.

Date of Government Version: 09/15/2014
Date Data Arrived at EDR: 09/18/2014
Date Made Active in Reports: 10/13/2014
Number of Days to Update: 25

Source: Department of Ecology
Telephone: 360-407-6950
Last EDR Contact: 12/08/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Semi-Annually

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 05/23/2006
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/06/2013
Number of Days to Update: 62

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/10/2014
Date Data Arrived at EDR: 07/02/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 11/04/2014
Next Scheduled EDR Contact: 02/16/2015
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 06/06/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 8

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 01/24/2014
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 31

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 09/30/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/26/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Varies

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/05/2014
Date Data Arrived at EDR: 09/04/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 74

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 12/03/2014
Next Scheduled EDR Contact: 03/16/2015
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/31/2013
Date Made Active in Reports: 09/13/2013
Number of Days to Update: 44

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 11/26/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/22/2014
Next Scheduled EDR Contact: 04/06/2015
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 11/19/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 11/19/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/31/2014
Date Data Arrived at EDR: 10/29/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 10/10/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 33

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/15/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 07/22/2013
Date Data Arrived at EDR: 08/02/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 91

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 12/04/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/07/2014
Date Data Arrived at EDR: 10/08/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 10/08/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/16/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 12/09/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 08/01/2014
Date Data Arrived at EDR: 08/12/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 10/27/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/26/2014
Next Scheduled EDR Contact: 03/09/2015
Data Release Frequency: Biennially

UIC: Underground Injection Wells Listing
A listing of underground injection wells.

Date of Government Version: 08/18/2014
Date Data Arrived at EDR: 08/20/2014
Date Made Active in Reports: 09/08/2014
Number of Days to Update: 19

Source: Department of Ecology
Telephone: 360-407-6143
Last EDR Contact: 11/21/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Varies

WA MANIFEST: Hazardous Waste Manifest Data
Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 05/23/2014
Date Made Active in Reports: 06/04/2014
Number of Days to Update: 12

Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 10/17/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Annually

DRYCLEANERS: Drycleaner List
A listing of registered drycleaners who registered with the Department of Ecology (using the SIC code of 7215 and 7216) as hazardous waste generators.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 05/23/2014
Date Made Active in Reports: 06/04/2014
Number of Days to Update: 12

Source: Department of Ecology
Telephone: 360-407-6732
Last EDR Contact: 10/17/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

NPDES: Water Quality Permit System Data
A listing of permitted wastewater facilities.

Date of Government Version: 10/21/2014
Date Data Arrived at EDR: 10/23/2014
Date Made Active in Reports: 10/28/2014
Number of Days to Update: 5

Source: Department of Ecology
Telephone: 360-407-6073
Last EDR Contact: 10/23/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Quarterly

AIRS (EMI): Washington Emissions Data System
Emissions inventory data.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 03/28/2014
Date Made Active in Reports: 04/22/2014
Number of Days to Update: 25

Source: Department of Ecology
Telephone: 360-407-6040
Last EDR Contact: 12/19/2014
Next Scheduled EDR Contact: 04/06/2015
Data Release Frequency: Annually

INACTIVE DRYCLEANERS: Inactive Drycleaners
A listing of inactive drycleaner facility locations.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 05/23/2014
Date Made Active in Reports: 06/04/2014
Number of Days to Update: 12

Source: Department of Ecology
Telephone: 360-407-6732
Last EDR Contact: 10/17/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Annually

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/18/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 11/07/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: N/A

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 10/31/2014
Next Scheduled EDR Contact: 02/09/2015
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 06/04/2014
Date Data Arrived at EDR: 06/12/2014
Date Made Active in Reports: 07/28/2014
Number of Days to Update: 46

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 10/06/2014
Next Scheduled EDR Contact: 01/19/2015
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 02/24/2012
Date Data Arrived at EDR: 02/24/2012
Date Made Active in Reports: 03/27/2012
Number of Days to Update: 32

Source: Department of Ecology
Telephone: 360-586-1060
Last EDR Contact: 11/17/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Varies

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 11/14/2014
Next Scheduled EDR Contact: 02/23/2015
Data Release Frequency: Varies

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 09/30/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Quarterly

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/29/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/29/2014
Next Scheduled EDR Contact: 01/12/2015
Data Release Frequency: Annually

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Site Listing

A listing of coal ash disposal site locations.

Date of Government Version: 09/10/2014
Date Data Arrived at EDR: 09/11/2014
Date Made Active in Reports: 10/15/2014
Number of Days to Update: 34

Source: Department of Ecology
Telephone: 360-407-6933
Last EDR Contact: 12/08/2014
Next Scheduled EDR Contact: 03/23/2015
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 10/17/2014
Next Scheduled EDR Contact: 01/26/2015
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information Listing
A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 03/06/2007
Date Made Active in Reports: 04/19/2007
Number of Days to Update: 44

Source: Department of Ecology
Telephone: 360-407-6136
Last EDR Contact: 11/18/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information
All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/04/2014
Date Data Arrived at EDR: 09/04/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 46

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 11/11/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing
A listing of financial assurance information for hazardous waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/23/2011
Date Data Arrived at EDR: 05/26/2011
Date Made Active in Reports: 06/27/2011
Number of Days to Update: 32

Source: Department of Ecology
Telephone: 360-407-6754
Last EDR Contact: 11/17/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: Varies

EPA WATCH LIST: EPA WATCH LIST
EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 11/14/2014
Next Scheduled EDR Contact: 02/23/2015
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Ecology in Washington.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Ecology in Washington.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Ecology in Washington.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/10/2014
Number of Days to Update: 193

Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

KING COUNTY:

Abandoned Landfill Study in King County

The King County Abandoned Landfill Survey was conducted from October through December 1984 by the Health Department's Environmental Health Division at the request of the King County Council. The primary objective of the survey was to determine if any public health problems existed at the predetermined 24 sites.

Date of Government Version: 04/30/1985
Date Data Arrived at EDR: 11/07/1994
Date Made Active in Reports: N/A
Number of Days to Update: 0

Source: Seattle-King County Department of Public Health
Telephone: 206-296-4785
Last EDR Contact: 10/21/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SEATTLE COUNTY:

Abandoned Landfill Study in the City of Seattle

The Seattle Abandoned Landfill Survey was conducted in June and July of 1984 by the Health Department's Environmental Health Division at the request of the Mayor's Office. The primary objective of the survey was to determine if any public health problems existed at the predetermined 12 sites.

Date of Government Version: 07/30/1984
Date Data Arrived at EDR: 11/07/1994
Date Made Active in Reports: N/A
Number of Days to Update: 0

Source: Seattle - King County Department of Public Health
Telephone: 206-296-4785
Last EDR Contact: 10/21/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SEATTLE/KING COUNTY:

Seattle - King County Abandoned Landfill Toxicity / Hazard Assessment Project

This report presents the Seattle-King County Health Department's follow-up investigation of two city owned and four county owned abandoned landfills which was conducted from February to December 1986.

Date of Government Version: 12/31/1986
Date Data Arrived at EDR: 08/18/1995
Date Made Active in Reports: 09/20/1995
Number of Days to Update: 33

Source: Department of Public Health
Telephone: 206-296-4785
Last EDR Contact: 08/14/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SNOHOMISH COUNTY:

Solid Waste Sites of Record at Snohomish Health District

Solid waste disposal and/or utilization sites in Snohomish County.

Date of Government Version: 11/16/2011
Date Data Arrived at EDR: 03/29/2012
Date Made Active in Reports: 05/03/2012
Number of Days to Update: 35

Source: Snohomish Health District
Telephone: 206-339-5250
Last EDR Contact: 12/22/2014
Next Scheduled EDR Contact: 04/06/2015
Data Release Frequency: Semi-Annually

TACOMA/PIERCE COUNTY:

Closed Landfill Survey

Following numerous requests for information about closed dumpsites and landfills in Pierce County, the Tacoma-Pierce County Health Department decided to conduct a study on the matter. The aim of the study was to evaluate public health risks associated with the closed dumpsites and landfills, and to determine the need, if any, for further investigations of a more detailed nature. The sites represent all of the known dumpsites and landfills closed after 1950.

Date of Government Version: 09/01/2002
Date Data Arrived at EDR: 03/24/2003
Date Made Active in Reports: 05/14/2003
Number of Days to Update: 51

Source: Tacoma-Pierce County Health Department
Telephone: 206-591-6500
Last EDR Contact: 03/19/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 11/17/2014
Next Scheduled EDR Contact: 03/02/2015
Data Release Frequency: No Update Planned

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 11/01/2014
Date Data Arrived at EDR: 11/05/2014
Date Made Active in Reports: 11/24/2014
Number of Days to Update: 19

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 11/05/2014
Next Scheduled EDR Contact: 02/16/2015
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 07/21/2014
Date Made Active in Reports: 08/25/2014
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 10/20/2014
Next Scheduled EDR Contact: 02/02/2015
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/20/2014
Date Made Active in Reports: 08/07/2014
Number of Days to Update: 48

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 12/12/2014
Next Scheduled EDR Contact: 03/30/2015
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Daycare Center Listing
Source: Department of Social & Health Services
Telephone: 253-383-1735

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

MEADOWDALE PARK
6026 156TH ST SW
EDMONDS, WA 98026

TARGET PROPERTY COORDINATES

Latitude (North):	47.8642 - 47˚ 51’ 51.12’’
Longitude (West):	122.3328 - 122˚ 19’ 58.08’’
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	549902.1
UTM Y (Meters):	5301203.5
Elevation:	61 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	47122-G3 EDMONDS EAST, WA
Most Recent Revision:	1981
North Map:	47122-H3 MUKILTEO, WA
Most Recent Revision:	1978

EDR’s GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

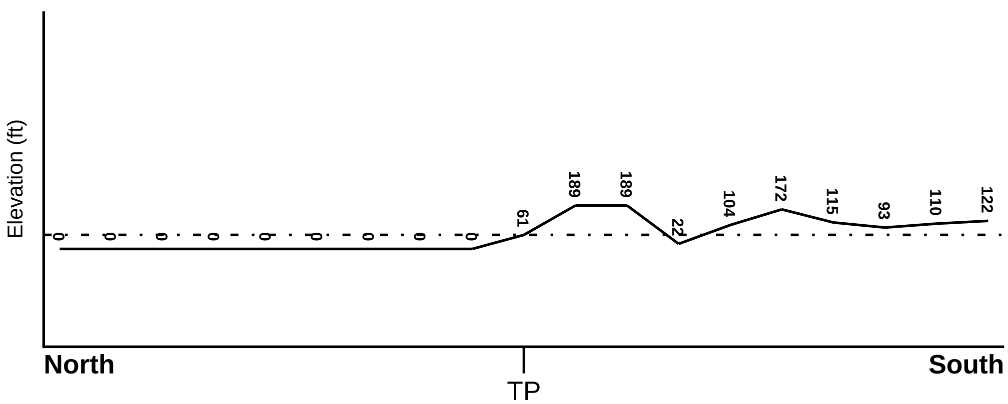
TOPOGRAPHIC INFORMATION

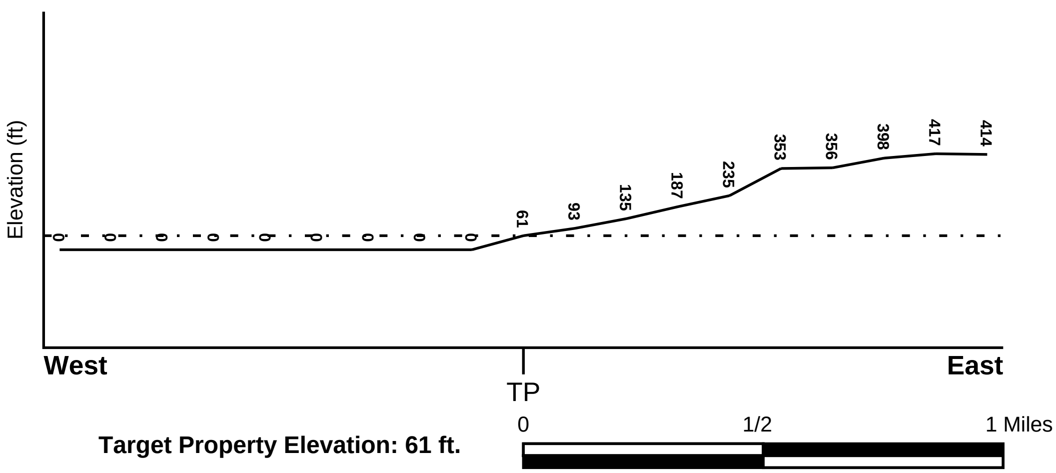
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General NW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 61 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
SNOHOMISH, WA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: Not Reported

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EDMONDS EAST	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius: 1.25 miles
Status: Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

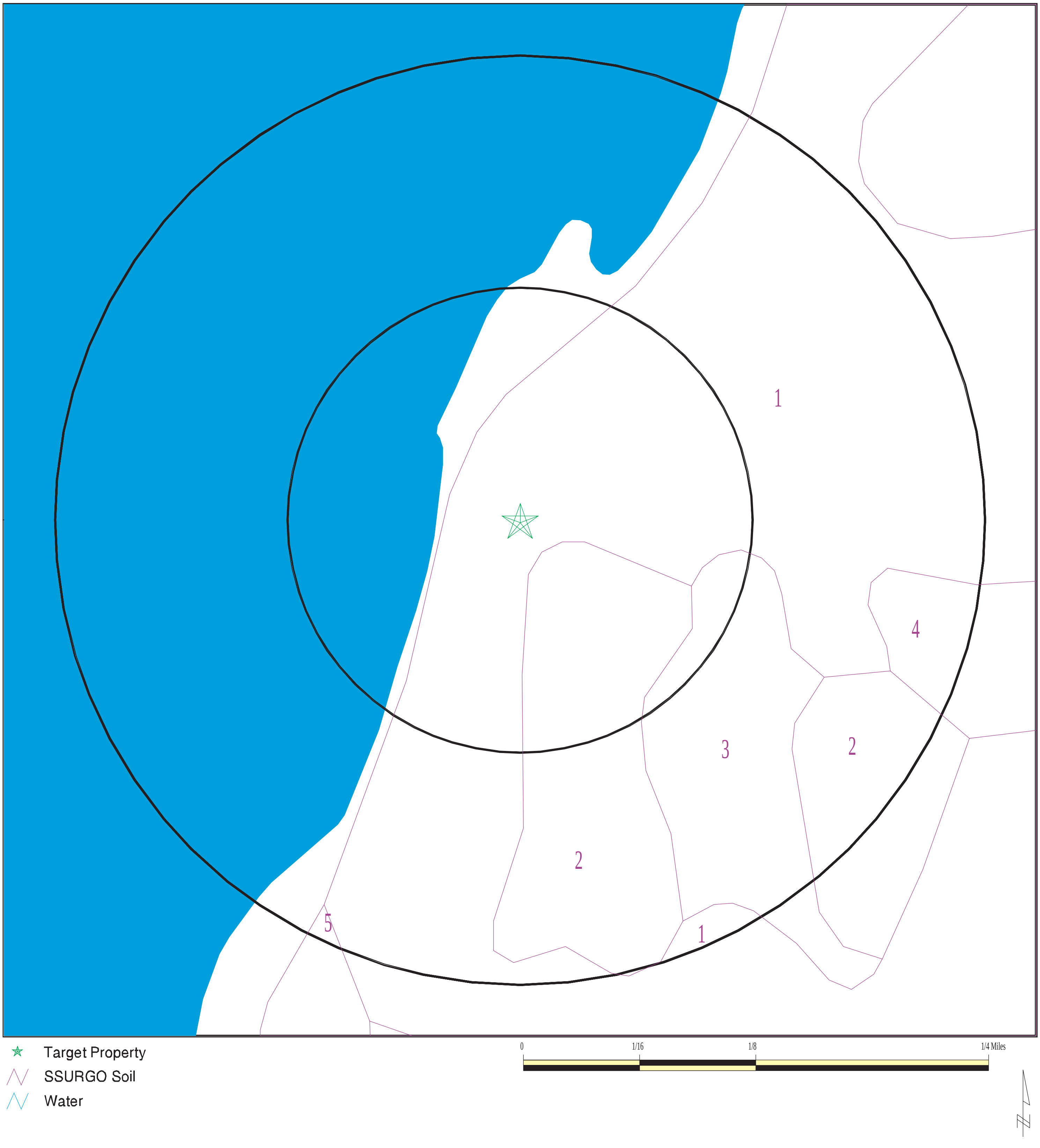
Era:	Cenozoic
System:	Quaternary
Series:	Quaternary
Code:	Q *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 4168089.2s



SITE NAME:	Meadowdale Park	CLIENT:	Shannon & Wilson, Inc.
ADDRESS:	6026 156th St SW	CONTACT:	Cody Johnson
	Edmonds WA 98026	INQUIRY #:	4168089.2s
LAT/LONG:	47.8642 / 122.3328	DATE:	December 23, 2014 1:12 pm

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Alderwood

Soil Surface Texture: gravelly sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 69 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 42 Min: 14	Max: 6.5 Min: 5.1
2	7 inches	35 inches	very gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 42 Min: 14	Max: 6.5 Min: 5.6
3	35 inches	59 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1

Soil Map ID: 2

Soil Component Name: Alderwood

Soil Surface Texture: gravelly sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 69 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 42 Min: 14	Max: 6.5 Min: 5.1
2	7 inches	35 inches	very gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 42 Min: 14	Max: 6.5 Min: 5.6
3	35 inches	59 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1

Soil Map ID: 3

Soil Component Name: Tokul

Soil Surface Texture: gravelly loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 69 inches

Soil Layer Information

	Boundary			Classification			
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**	**Saturated hydraulic conductivity micro m/sec**	**Soil Reaction (pH)**
1	0 inches	3 inches	gravelly loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 14 Min: 4	Max: 6.5 Min: 5.1
2	3 inches	22 inches	gravelly loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6.5 Min: 5.1
3	22 inches	31 inches	gravelly fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6.5 Min: 5.1
4	31 inches	59 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1

Soil Map ID: 4

Soil Component Name: Alderwood

Soil Surface Texture: gravelly sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 69 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 42 Min: 14	Max: 6.5 Min: 5.1
2	7 inches	35 inches	very gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 42 Min: 14	Max: 6.5 Min: 5.6
3	35 inches	59 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1

Soil Map ID: 5

Soil Component Name: Fluvaquents

Soil Surface Texture: silt loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Organic Clay or Organic Silt.	Max: 14 Min: 4	Max: 5.5 Min: 3.6
2	7 inches	59 inches	stratified sand to silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 1.4 Min: 0.42	Max: 7.3 Min: 3.6

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	USGS40001275096	1/4 - 1/2 Mile ESE
2	USGS40001275160	1/4 - 1/2 Mile East

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

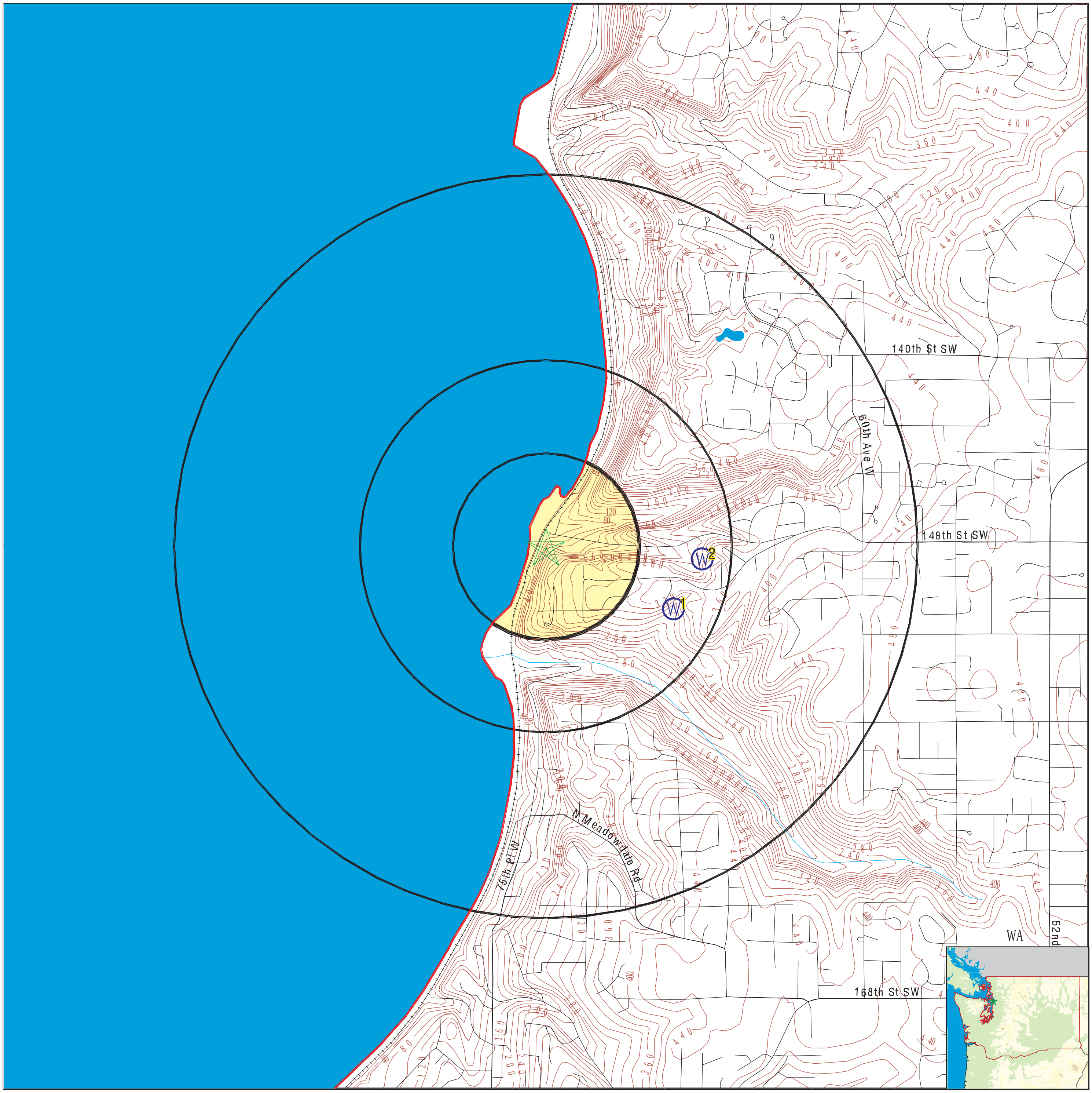
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 4168089.2s



County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Miles

Groundwater Flow Direction
GI Indeterminate Groundwater Flow at Location
GV Groundwater Flow Varies at Location
HD Closest Hydrogeological Data

SITE NAME:	Meadowdale Park	CLIENT:	Shannon & Wilson, Inc.
ADDRESS:	6026 156th St SW	CONTACT:	Cody Johnson
	Edmonds WA 98026	INQUIRY #:	4168089.2s
LAT/LONG:	47.8642 / 122.3328	DATE:	December 23, 2014 1:12 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation		Database	EDR ID Number
1 **ESE** **1/4 - 1/2 Mile** **Higher**		**FED USGS**	**USGS40001275096**

Org. Identifier:	USGS-WA		
Formal name:	USGS Washington Water Science Center		
Monloc Identifier:	USGS-475143122192701		
Monloc name:	27N/04E-05C02		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	17110019	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	47.8617628
Longitude:	-122.3254115	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	260
Vert measure units:	feet	Vertacc measure val:	10
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19810921	Welldepth:	358
Welldepth units:	ft	Wellholedepth:	358
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1993-04-15	316.99		1981-09-25	309	

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2 **East** **1/4 - 1/2 Mile** **Higher**		**FED USGS**	**USGS40001275160**

Org. Identifier:	USGS-WA		
Formal name:	USGS Washington Water Science Center		
Monloc Identifier:	USGS-475150122192101		
Monloc name:	27N/04E-05B01		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	17110019	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	47.8637072
Longitude:	-122.3237449	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	260
Vert measure units:	feet	Vertacc measure val:	10
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Aquifer type:	Not Reported		
Construction date:	19871021	Welldepth:	160
Welldepth units:	ft	Wellholedepth:	160
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 13

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1995-01-17	135.37		1994-11-23	135.10	
1994-09-29	135.06		1994-07-14	135.06	
1994-05-19	34.90		1994-03-24	135.01	
1994-01-20	134.83		1993-11-26	134.88	
1993-09-24	134.73		1993-07-30	134.84	
1993-05-27	134.66		1993-03-26	134.90	
1992-06-02	134.08				

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for SNOHOMISH County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 98026

Number of sites tested: 4

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.025 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	0.050 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5’ Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5’ Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5’ Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture’s (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Wells
Source: Department of Health
Telephone: 360-236-3148
Group A and B well locations.

Water Well Listing
Source: Public Utility District
Telephone: 206-779-7656
A listing of water well locations in Kitsap County.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Listing
Source: Department of Natural Resources
Telephone: 360-902-1450
Locations that represent oil and gas test well sites in Washington State from 1890 to present.

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR’s Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

APPENDIX C

IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL SITE ASSESSMENT/EVALUATION REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 21-1-22034-001

Date: September 15, 2015
To: Ms. Kathy Ketteridge
Anchorage QEA, LLC

IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL SITE ASSESSMENT/EVALUATION REPORT

ENVIRONMENTAL SITE ASSESSMENTS/EVALUATIONS ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

This report was prepared to meet the needs you specified with respect to your specific site and your risk management preferences. Unless indicated otherwise, we prepared your report expressly for you and for the purposes you indicated. No one other than you should use this report for any purpose without first conferring with us. No one is authorized to use this report for any purpose other than that originally contemplated without our prior written consent.

The findings and conclusions documented in this site assessment/evaluation have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in this area. The conclusions presented are based on interpretation of information currently available to us and are made within the operational scope, budget, and schedule constraints of this project. No warranty, express or implied, is made.

OUR REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

Our environmental site assessment is based on several factors and may include (but not be limited to): reviewing public documents to chronicle site ownership for the past 30, 40, or more years; investigating the site's regulatory history to learn about permits granted or citations issued; determining prior uses of the site and those adjacent to it; reviewing available topographic and real estate maps, historical aerial photos, geologic information, and hydrologic data; reviewing readily available published information about surface and subsurface conditions; reviewing federal and state lists of known and potentially contaminated sites; evaluating the potential for naturally occurring hazards; and interviewing public officials, owners/operators, and/or adjacent owners with respect to local concerns and environmental conditions.

Except as noted within the text of the report, no sampling or quantitative laboratory testing was performed by us as part of this site assessment. Where such analyses were conducted by an outside laboratory, Shannon & Wilson relied upon the data provided and did not conduct an independent evaluation regarding the reliability of the data.

CONDITIONS CAN CHANGE.

Site conditions, both surface and subsurface, may be affected as a result of natural processes or human influence. An environmental site assessment/evaluation is based on conditions that existed at the time of the evaluation. Because so many aspects of a historical review rely on third party information, most consultants will refuse to certify (warrant) that a site is free of contaminants, as it is impossible to know with absolute certainty if such a condition exists. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas that showed no signs of contamination at the time they were studied.

Unless your consultant indicates otherwise, your report should not be construed to represent geotechnical subsurface conditions at or adjacent to the site and does not provide sufficient information for construction-related activities. Your report also should not be used following floods, earthquakes, or other acts of nature; if the size or configuration of the site is altered; if the location of the site is modified; or if there is a change of ownership and/or use of the property.

INCIDENTAL DAMAGE MAY OCCUR DURING SAMPLING ACTIVITIES.

Incidental damage to a facility may occur during sampling activities. Asbestos and lead-based paint sampling often require destructive sampling of pipe insulation, floor tile, walls, doors, ceiling tile, roofing, and other building materials. Shannon & Wilson does not provide for paint repair. Limited repair of asbestos sample locations are provided. However, Shannon & Wilson neither warranties repairs made by our field personnel, nor are we held liable for injuries or damages as a result of those repairs. If you desire a specific form of repair, such as those provided by a licensed roofing contractor, you need to request the specific repair at the time of the proposal. The owner is responsible for repair methods that are not specified in the proposal.

READ RESPONSIBILITY CLAUSES CAREFULLY.

Environmental site assessments/evaluations are less exact than other design disciplines because they are based extensively on judgment and opinion, and there may not have been any (or very limited) investigation of actual subsurface conditions. Wholly unwarranted claims have been lodged against consultants. To limit this exposure, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses may appear in this report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

Consultants cannot accept responsibility for problems that may develop if they are not consulted after factors considered in their reports have changed, or conditions at the site have changed. Therefore, it is incumbent upon you to notify your consultant of any factors that may have changed prior to submission of the final assessment/evaluation.

An assessment/evaluation of a site helps reduce your risk, but does not eliminate it. Even the most rigorous professional assessment may fail to identify all existing conditions.

ONE OF THE OBLIGATIONS OF YOUR CONSULTANT IS TO PROTECT THE SAFETY, HEALTH, PROPERTY, AND WELFARE OF THE PUBLIC.

If our environmental site assessment/evaluation discloses the existence of conditions that may endanger the safety, health, property, or welfare of the public, we may be obligated under rules of professional conduct, statutory law, or common law to notify you and others of these conditions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX K
RELEVANT PERMITS TABLE

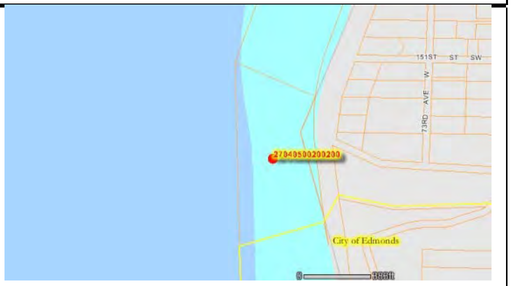
Appendix K
Potential Environmental Approvals and Permit Matrix

Permit/Approval	Agency	Trigger	Notes	Early Agency Feedback
Federal Jurisdiction: Permits				
Clean Water Act Section 404 (Section 404 permit)	Corps	Discharge of dredged or fill material into waters of the United States, including adjacent special aquatic sites such as wetlands	Applicable to the Project for proposed shoreline modifications that involve grading (dredging) or fill below OHWM. Type of permit – Nationwide vs Individual – is not yet determined.	Corps will solicit comments on the complete permit application from public and interested tribes (in this case – Swinomish, Suquamish, and Tulalip Tribes) during a public comment period.
Rivers and Harbors Act Section 10 (Section 10 Permit)	Corps/ US Coast Guard	Any proposed work in, over, or under navigable waters of the United States that affects navigable capacity	USACE application processed together with Section 404 permit. US Coast Guard (bridge permit) would be a separate approval.	The Corps will solicit tribal comments as noted above.
Federal Jurisdiction: Associated Approvals				
National Environmental Policy Act Compliance	Lead federal agency	Projects with a federal nexus (e.g., led by a federal agency, receiving federal funding, located on federal lands, or requiring a federal permit)	Assume that NEPA review will be completed by the Corps as part of the individual 404/10 permit.	

Permit/Approval	Agency	Trigger	Notes	Early Agency Feedback
Endangered Species Act Section 7 Consultation	NOAA Fisheries and U.S. Fish and Wildlife Service (collectively called "the Services")	All projects with federal nexus are subject to Section 7 of the ESA, which requires federal agencies to ensure that projects they authorize, permit, or fund do not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat	ESA consultation led by the Corps; a biological assessment will be prepared for the Project to support the Corps permit process.	
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation	NOAA Fisheries	Consultation is required to ensure that federal actions adequately avoid, minimize, or mitigate any activity that may affect EFH	EFH consultation occurs concurrently with ESA consultation.	

Permit/Approval	Agency	Trigger	Notes	Early Agency Feedback
National Historic Preservation Act Section 106 Consultation	The Corps, in coordination with the Washington State Department of Archaeology and Historic Preservation	Projects with a federal nexus are subject to Section 106 of the NHPA, which evaluates actions that have the potential to affect cultural, archaeological, or historic properties	Initial cultural resources reconnaissance for the Project shows that there are no recorded archaeological sites in the Park, and there have been no cultural resources survey in the Park. The site has a number of historic activities that may be represented archaeologically; archaeological potential is considered moderate to high.	
State Jurisdiction: Permits				
Clean Water Act Section 401 Water Quality Certification	Ecology	Applying for a federal permit or license to conduct any activity that might result in a discharge of dredge or fill material into water or non-isolated wetlands or excavation in water or non-isolated wetlands	This permit must be issued within 365 days of application submittal and is a predecessor to the CWA Section 404 Permit. If the 365-day timeframe is exceeded, the applicant will be required to withdraw the application and re-start the process.	
Coastal Zone Management Act Federal Consistency Determination	Ecology	Projects that contain a federal nexus proposed within any of Washington's 15 coastal counties	Process with Section 404 Permit. CZMA needs SEPA and local shoreline approval to be complete prior to issuance; then the Corps needs CZMA complete for issuance of the CWA Section 404 and RHA Section 10 permits.	

Permit/Approval	Agency	Trigger	Notes	Early Agency Feedback
Clean Water Act Section 402 National Pollutant Discharge Elimination System Construction Stormwater General Permit	Ecology	Required for all soil-disturbing activities where 1 or more acres will be disturbed and have a discharge of stormwater to a receiving water or storm drains that discharge into a receiving water (i.e., wetland, creek, river, marine water, ditch, or estuary)	Cannot apply for NPDES until SEPA process is complete	
Hydraulic Project Approval	WDFW	Proposed activity that uses, diverts, obstructs, or changes the natural flow or bed of any of the salt- or freshwaters of the state	New hydraulic code in effect July 1, 2015.	

Permit/Approval	Agency	Trigger	Notes	Early Agency Feedback
Aquatic Use Authorization	WDNR	Activities on land owned by WDNR and/or under a lease agreement with WDNR	Snohomish County tax parcel maps show the owner as Snohomish Country Property Management and part of the John C Lunds Reserve (https://www.snoco.org/proptax/(wgwd5aipculdr2555yubtf45)/search.aspx?parcel_number=27040500200200 parcel number: 27040500200200) BNSF owns the adjacent property	
Executive Order 05-05	DAHP	RCO/state-funding	Complete EZ-1 Form summarizing potential impacts to historic/cultural properties to support state grant funding process(es) as applicable.	
Local Jurisdiction Permits and Environmental Approvals				
State Environmental Policy Act Compliance	Snohomish County Planning and Development	Any proposal that requires a state or local agency decision to license, fund, or undertake a project, or the proposed adoption of a policy, plan, or program can trigger environmental review under SEPA	The culvert maintenance work at the site was recently completed through SEPA checklist level review (Spring 2015). Future SEPA evaluations should demonstrate consistency with other planning documents (e.g. Parks Plan, Shoreline Master Program Update, Comprehensive Plan Update)	

Permit/Approval	Agency	Trigger	Notes	Early Agency Feedback
Shoreline Substantial Development Permit	Snohomish County Planning and Development Services	Proposed activities occurring within the Shoreline Management Act jurisdiction (generally within 200 feet of mean higher high water)	Snohomish County maps show the shoreline designation is Urban Conservancy Shoreline Environment (http://gis.snoco.org/maps/permits/viewer.htm) The proposed project is consistent with the allowed uses under the Urban Conservancy designation in the SMP. Note that bridges are considered a conditional use under this designation.	
Critical Areas Review	Snohomish County Planning and Development Service	Proposed work within County-designated critical areas.	Project will need to follow critical areas regulations for Wetlands and Fish & Wildlife Habitat and Geologic Hazard Areas.	Critical Areas Regulations currently being updated at the County.
Private Permits				
Private Property Access/ Easement	BNSF	Proposed activities/ construction on BNSF-owned property.	Ongoing conversations with the railroad are underway, led by the County.	

Notes:

This list of permits and approvals is based on Anchor QEA and is subject to change based on project complexity and locale.

BNSF – Burlington Northern Sante Fe Railroad
Corps = U.S. Army Corps of Engineers
CUP = Conditional Use Permit
CWA = Clean Water Act
CZMA = Coastal Zone Management Act
Ecology = Washington State Department of Ecology
EFH = Essential Fish Habitat
EIS = Environmental Impact Statement
ESA = Endangered Species Act
HPA = Hydraulic Project Approval
LUC = City of Bellevue Land Use Code
NEPA = National Environmental Policy Act
NHPA = National Historic Preservation Act
NOAA = National Oceanographic and Atmospheric Agency
NPDES = National Pollutant Discharge Elimination System
OHWM = Ordinary High Water Mark
RHA = Rivers and Harbors Act
SEPA = State Environmental Protection Act
SCUP = Shoreline Conditional Use Permit
SMP = Shoreline Master Plan
SSDP = Shoreline Substantial Development Permit
USCG = U.S. Coast Guard
WDFW = Washington Department of Fish & Wildlife
WDNR – Washington Department of Natural Resources
WQC = Water Quality Certification

APPENDIX L
REFINE PREFERRED ALTERNATIVE
BNSF AND PERMITTING AGENCY COORDINATION MEETING SUMMARIES

APPENDIX L-1
MEETING SUMMARY: BNSF REVIEW MEETING FOR PREFERRED ALTERNATIVE

Meeting Summary:

BNSF Review Meeting for Preferred Alternative

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time:	Thursday, June 18, 2015, 1:00 pm to 3:00 pm
Location:	Willis Tucker Park Administration Bldg. 6705 Puget Park Drive, Snohomish, Washington Vista Conference Room

Introductions

Attendees included Tom Teigen, Logan Daniels, and Kathleen Herrmann from Snohomish County, Peter Hummel and Kathy Ketteridge from Anchor QEA, Bret Farmer and Matt Christianson from TKDA, Matt Gibson and Will Hultman from Shannon and Wilson, and Rick Wagner from BNSF.

Project Overview

- **Motivation for the Project**

Tom provided an overview of the history of the project and reasons for why improvements to the existing tunnel are needed at this time. The current tunnel is undersized based on current sediment loads and higher flows in the creek. The tunnel is often flooded, impeding pedestrian access through the tunnel to the beach and causing flooding in the park area upland of the railroad berm. The tunnel is therefore closed to pedestrians regularly, and pedestrians have been seen trespassing across the BNSF tracks in order to get to the beach. This is a safety concern for both the County and BNSF. The County has taken on the responsibility of finding funds to move the project forward through design and construction, and is looking at a 3 to 5 year window to get the project completed.

- **Process to Date**

Logan provided an overview of the project efforts to date, including an overview of the consultant team qualifications, studies that have been performed, and outreach to the public and stakeholder groups. The Anchor QEA led team includes TKDA, Shannon and Wilson, and DHA Surveyors. These three subconsultants were included on the team because of their BNSF experience that helped inform development of a preferred alternative that would be in-line with BNSF standards and concerns. Logan added that at present, environmental permitting agencies are allowing the County to remove impounded sediment from the tunnel and creek to restore creek flow and pedestrian access following a flood event. However, the County has been informed that permitting agencies will not allow the County to continue to remove sediment from the creek in this manner indefinitely, and that another, long-term, sustainable solution to the sediment issues needs to be implemented. The preferred alternative being presented at the meeting is the one that best meets the multiple objectives of the project and is favored by the County, stakeholder groups, and general public. Currently, the final feasibility report is being developed for the project. One important County goal for the project is improving habitat for federally listed (Endangered Species Act) Puget Sound Chinook Salmon as part of the Project. In addition to committing substantial County funds, the County has applied for a State of Washington, Salmon Recovery Funding Board grant to obtain funds for design of the project, and based on granting agency feedback, the County anticipates receiving those grant funds to move the project forward into design. The County is also in process of exploring funding options for construction of the project in the future (3 to 5 year time frame).

Review of Preferred Alternative

- **Description of Preferred Alternative**

Logan and Matt C. went over the exhibits and described the elements of the project. Discussion included the four span bridge and potential shoo-fly track as shown in provided exhibits (see Attachment 1). Construction methods for the bridge and shoo-fly, including anticipated work windows were discussed. The shoo-fly alignment included in exhibits meets BNSF standards, but would require significant cuts into the adjacent steep slopes. These slopes have a history of landslides, and cutting into these slopes to build the shoo-fly track (along presented alignment) is not recommended from a risk perspective. A shoo-fly track along the waterside of the existing track has not been explored due to permit feasibility issues. There are access challenges at this site, and at this time the consultant team is assuming all materials and equipment would need to come in via rail or water.

- **Mutual Benefits to County and BNSF**

The benefits of the preferred alternative presented include (1) unrestricted pedestrian access to the beach which will eliminate the motivation for pedestrians to cross the tracks at this location, (2) allowance for conveyance of high flows and sediment loads from Lund's Gulch Creek reducing maintenance needs, (3) a significantly more sustainable structure than the current under-sized culvert taking into account potential increase in flows and sediment loads to the creek and sea level rise, and (4) re-establishment of an estuary similar in characteristics to pre-railroad that will provide habitat for federally listed Chinook and other salmonids along with other vertebrates and invertebrates. In addition, restoration opportunities provided by the bridge opening are tied to state and federal funding opportunities that increase project feasibility.

BNSF Review Comments on Preferred Alternative

Rick Wagner summarized BNSF considerations for the project and potential challenges associated with design and construction of the preferred alternative:

- BNSF requested that the County address the current trespassing issues at the park. Specifically, he requested that the County maintain the fence. Logan let Rick know that the existing fence is within the BNSF right-of-way and that Parks does not have any agreement with BNSF to work within their right-of-way for fence installation. Logan let Rick know that she had met with John Smith (from BNSF) in late January on site to discuss this issue. The County had followed up with three emails but had not had any response. Rick requested that the County work with him to address the issue.

- BNSF does not seek any additional assets (e.g. bridges) along this line; however they want to be good neighbors. If BNSF took over maintenance of the culvert, which they own, they would likely be allowed to continue to clear out sediment from the tunnel under current BNSF permits. However, they would not maintain pedestrian access through the tunnel.

- Scheduling will be a challenge for this project. BNSF cannot provide "absolute" windows in which to do the work. Construction windows may be scheduled with BNSF, but could be taken away or rescheduled at any time. Trains with schedules include Amtrak and "Sounder" (Sound Transit) commuter trains. Freight trains do not run on pre-established schedules. This can result in large costs to the construction of the project due to delays and corresponding down-time for construction contractor personnel and equipment. Some options to consider when thinking about scheduling including (1) looking at time windows between Sounder train runs, (2) weekends when Sounder trains don't run as often, (3) piggy backing on windows associated with maintenance activities that BNSF is doing along that line (if any), (4) holidays, and (5) quarterly trends in train traffic along the line, (avoiding 4^{th} quarter which is the busiest).

- Train traffic will continue to increase along this line. Tom pointed out that this is another good motivator to do this project now.

- Rick verified that BNSF would prefer not to have open cuts along the line, which would be required to construct larger or additional box culverts at the site instead of a bridge. It was also discussed that jacking a box culvert would not be preferred and most likely would not be possible given the existing material in the embankment.

- Rick and Matt discussed the possibility of using a slow-speed shoo-fly track on the landward side of the existing track for this project, and Rick said that BNSF would consider this option.

  The issue of proposing to close down both tracks during our "work windows," as opposed to only one track being shut down at a time was discussed. Matt and Brett clarified that only one track was going to be impacted by each "work window,", and not both. This was an important clarification regarding the feasibility of the Project.

Coordination and Review Process with BNSF

Additional comments from Rick on specific aspects of the coordination and review process are summarized as follows:

- **BNSF Construction and Maintenance Agreement**

BNSF does not have a sample agreement they can share with the County at this time.

- **Rail Control and Work Windows**

6-hour windows may be difficult to schedule along this line, and Rick encouraged the County to look into the possibility of a low-speed shoo-fly track alignment for the project, or submit anticipated work windows required to construct the project should be submitted to BNSF, along with the review comments form and bridge figures.

- **Options for Bridge Construction: BNSF or Contractor**

Under current conditions BNSF would not construct this bridge; it would be constructed by a contractor hired by the County. BNSF would lay down the ballast and lay the rail. However, in 3-5 years, the availability of BNSF to perform work on the Project could change.

- **Submittal Requirements for BNSF Review (30%, 60%, 90%, Final)**
  - **BNSF Review timeframes**

Submittal requirements would be at typical design milestones, 30%, 60%, 90% and Final. Review time frames were not discussed in detail at the meeting.

Anticipated Project Costs (Design Review, Legal/Indemnification, Maintenance)

The legal/indemnification language would follow Washington State Law and BNSF rarely makes changes to this standard language. Maintenance costs are determined by engineering at BNSF and take into account long-term needs of the bridge (mitigation). When submitting the review form and exhibits to BNSF, the County can ask for a potential range of costs for the maintenance that the County would need to pay at the time construction is completed.

The County is currently seeking a design grant through Salmon Recovery Funding Board. A Land Owner Acknowledgement Form is required as part of the submittal due August 14, 2015. Rick provided his signature on the form (copy attached).

Next Steps

The County, and consultant team, will develop a submittal to BNSF for their review and comment that will include:

- Review form (BNSF preferred format,-Rick suggested that TKDA assist with filling out the form).

- Bridge figures provided during the meeting (developed by TKDA)

- Details on how the bridge would be constructed, including requested work windows or potential low speed shoo-fly track alignment. Rick suggested using 3.5 hour work windows to evaluate construction schedule for the work (this is the time between the Sounder and Amtrak trains along this line)

ATTACHMENTS:

1) Signed copy of Landowner Acknowledgement Form for Salmon Recovery Funding Board grant application due August 14, 2015

Appendix F: Landowner (BNSF) Acknowledgement Form

Landowner Information

Name of Landowner: BNSF Railway

Landowner Contact Information:

☐ Mr. ☐ Ms. Title:

First Name: Richard Last Name: Wagner

Contact Mailing Address: 2454 Occidental Avenue So Ste 2D

Contact E-Mail Address: Richard.Wagner@BNSF.com

Property Address or Location:

1. (Landowner or Organization) is the legal owner of property described in this grant application. RWW
2. I am aware that the project is being proposed on my property. RWW
3. If the grant is successfully awarded, I will be contacted and asked to engage in negotiations. RWW
4. My signature does not represent authorization of project implementation. RWW

Landowner Signature Date 06.18.2015

Project Sponsor Information

Project Name: Meadowdale Beach Barrier Removal Project

Project Applicant Contact Information:

__ Mr. ___X_ Ms. Title: Snohomish County Parks Engineer

First Name: Logan Last Name: Daniels

Mailing Address: 6705 Puget Park Drive Snohomish, WA 98296

E-Mail Address: logan.daniels@snoco.org

APPENDIX L-2
MEETING SUMMARY: PERMITTING AGENCY MEETING FOR PREFERRED ALTERNATIVE

Meeting Summary: Meadowdale Beach County Park Permitting Agency Meeting for Preferred Alternative

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time:	Tuesday, July 28, 2015, 10:00 am to 12:00 pm
Location:	Meadowdale Beach County Park via ADA access road 15433 75th Place West \ (meet at Picnic Shelter)

Introductions

Attendees included Logan Daniels, Mark Stamey and Kathleen Herrmann from Snohomish County, Kathy Ketteridge from Anchor QEA, Paul Schlenger from Confluence Environmental, Rebekah Padgett and Hugh Shipman from Washington Department of Ecology, and Laura Arber and Jamie Bails of Washington Department of Fish and Wildlife.

Project Overview

Motivation for the Project

Logan provided an overview of the history of the project and reasons for why improvements to the existing tunnel are needed at this time. The current tunnel is undersized based on current sediment loads and higher flows in the creek. The tunnel is often flooded, impeding pedestrian access through the tunnel to the beach and causing flooding in the park area upland of the railroad berm. The tunnel is therefore closed to pedestrians regularly, and pedestrians have been seen trespassing across the BNSF tracks in order to get to the beach. Logan added that past practice included removing gravels within the tunnel only and hauling off-site under an approved HPA permit. However, presently the County is awaiting approval on several new permits to allow removal of gravels within the tunnel, as well as dredging activities on the beach to permit creek flows to drain from culvert to the Sound and then placement of excavated gravels on the beach for beach nourishment. The County has been informed that permitting agencies will not allow the County to continue to remove sediment from the creek in this manner indefinitely, and that another, long-term, sustainable solution to the sediment issues needs to be implemented.

Project Progress to Date

Logan provided an overview of the project efforts to date, including an overview of the consultant team qualifications, studies that have been performed, and outreach to the public and stakeholder groups. The Anchor QEA led team includes TKDA, Shannon and Wilson, and DHA Surveyors. These three sub-consultants were included on the team because of their BNSF experience that helped inform development of a preferred alternative. The preferred alternative being presented at the meeting is the one that best meets the multiple objectives of the project and is favored by the County, stakeholder groups, and general public. Currently, the final feasibility report is being developed for the project. One important County goal for the project is improving habitat for federally listed (Endangered Species Act) Puget Sound Chinook Salmon as part of the Project. In addition to committing substantial County funds, the County has applied for a State of Washington, Salmon Recovery Funding Board grant to obtain funds for design of the project. The County anticipates receiving those grant funds to move the project forward into design. The County is also in process of exploring funding options for construction of the project in the future (3 to 5 year time frame).

Overview of Preferred Alternative

Description and Benefits of Preferred Alternative

Discussion included the four span bridge, potential habitat improvements, trail and recreation improvements, pedestrian bridge, and conversion of the lawn to habitat, as shown in provided exhibits (see Attachment 1). Paul Schlenger provided an overview of the existing habitat at the project site and the anticipated habitat improvements provided the proposed project. The access challenges at this site were discussed; at this time the consultant team is assuming all materials and equipment would need to come in via rail or water.

Overview of Public and Stakeholder Input and BNSF Coordination

Logan provided an overview of the public and stakeholder meeting process (four meetings in total) and stated that the preferred alternative was favored by the public and stakeholders. A meeting was held with BNSF to review the preferred alternative, discuss potential work windows available at this location to complete construction of the preferred alternative, and to discuss BNSF review process for design.

Project Site Tour

The group completed a brief walking tour of the site to look at:

- Stream at foot bridge location (upland extent of proposed work)
- Lawn area
- Stream mouth upland of culvert
- Culvert access to beach
- Beach and nearshore area

Permitting Options Discussion

Following the tour, the group had a discussion of permitting options. Highlights of this discussion are summarized below:

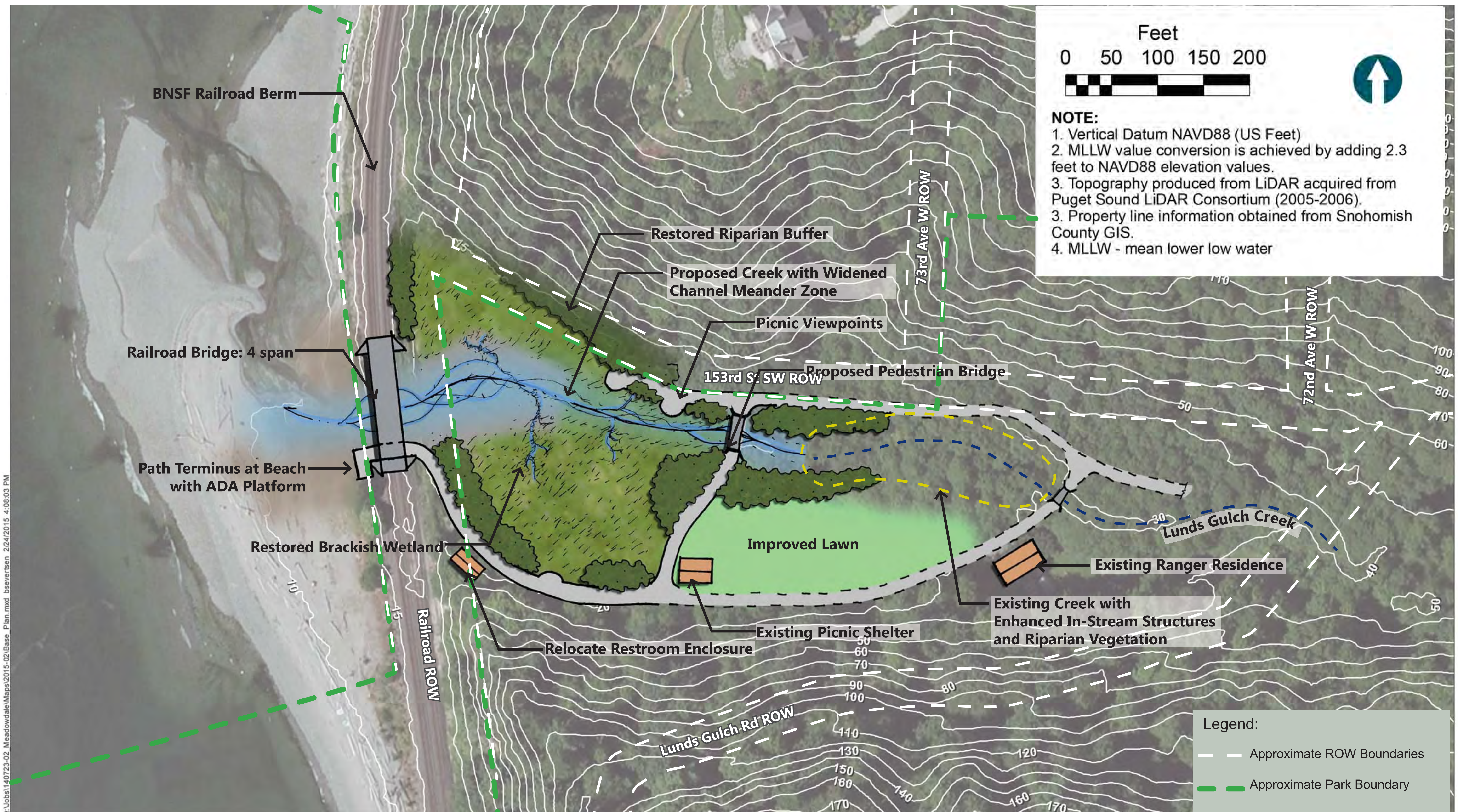
- WDFW and Ecology are supportive of the overall concept and concur that the proposed project is a significant improvement over the existing conditions.
- In-water work windows are expected to be tight at this site due to salmon work windows and forage fish work windows (due to documented sand lance at the project site). Work window (where in-water work can be done) is anticipated to be between

August 1 and October 1. There is the potential for accommodation regarding the sand lance work window, but would require good justification. Important to show that attempts have been made to avoid impacts in permitting documentation.

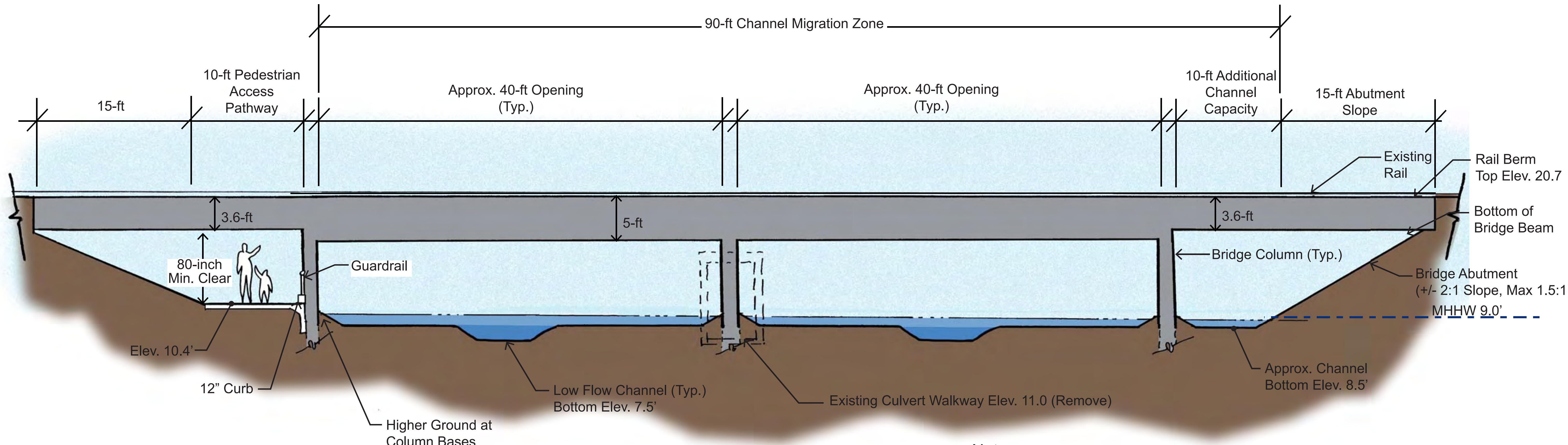
- Forage fish survey can be conducted with results shown on plans
- Staging area on the water side would be limited to areas above ordinary high water. Sandy dry areas to the south would be most suitable. Areas that are currently vegetated above ordinary high water would need to be re-planted as part of construction.
- Encouraged to keep pursuing BNSF for rail transport to extent practical and even look at air transport.
- In permitting documentation, include areas of different substrates on the beach. Areas that are primarily larger rock would not be suitable habitat; and would have less impact associated with them for construction (i.e. barge grounding, trestle construction, etc.)
- Construction of a temporary trestle would be permitable, but would require evaluation of minimization of short term impacts.
- Construction of a shoo-fly along the waterside of the tracks would be very difficult from a permitting perspective.
- Evaluation of potential for improving the road for use in construction access needs to be conducted as part of design. Even if it cannot be done, it is part of what will be required to show we have attempted to avoid impacts.
- Section 404 and Section 10 from Corps; combination of two Nationwide permits #14 (linear transportation) and 27 (habitat restoration)
- Section 402 and CZM from Ecology; Section 402 should be consistent with CORPS Nationwide's but amount of grading below OHWM might trigger Individual Permit.
- Section 106 needed from DAHP; will need cultural study and possibly an archaeologist on site during removal of railway fill
- Nationwide 6 permit is required for geotechnical investigation.
- Shoreline permits required and should focus on restoration and facilitating public access.
- County permits required include LDA, Shoreline (Substantial Development and Conditional Use; Building (for both bridges) and Flood Hazard
- HPA would be required from WDFW
- Aquatic Lands Easement from WDNR not required because County owns tidelands.
- Construction Stormwater permit would be required from DOE
- Ecology would like to have the opportunity to comment on construction methods once we have additional information. Will want information for entire project; from the creek to the Sound.

- The earlier the SEPA process is begun and better documented it is; the better that process will go, paying particular attention to the public process and documenting in checklist.
- Will be looking at an expanded checklist and MDNS
- Any eagles nests nearby will require a take permit.
- Key to keep Tribes involved throughout the process.
- Any benefit of the project that can be documented for sand lance would be helpful for the project.
- There was general agreement that this site was unusual in that it had a large sediment load that could benefit the nearshore area; if it could all reach the beach in a natural way.
- WDFW commented to make sure footbridge is designed to latest WAC requirements.

Attachment 1



Preferred Alternative: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat



Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

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